The Welding Engineer

Reg. U. S. Pat. Office

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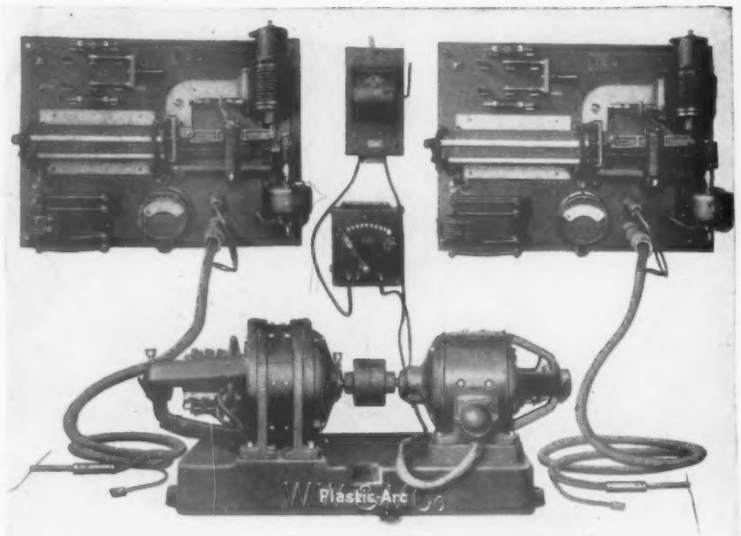
WILSON Plastic-Arc WELDER

The Wilson Plastic-Arc Welder will successfully weld any metal of any bulk without preheating (distortion) dismantling or annealing.



Two-Arc, 300 Ampere Wilson Plastic Arc Welder

Wilson Welds are from 50 to 250% stronger than those made by any other method or system of welding and can be made at about one-seventh the cost. This has been fully demonstrated in competitive tests.

The great success of the Wilson Welder in making lasting welds on the nine-foot cast-iron cylinders of the German ships, and also in numberless other cases, is due to the fact that the critical heat at which the metal should be fused is kept constant at the arc.

This predetermined, critical and constant heat eliminates the possibility of burnt metal or voids resulting in failure, common in welds when the critical heat cannot be controlled.

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3 Rector Street **New York City**

Entered as second-class matter January 20, 1916, at the postoffice at Chicago, Illinois, under the act of March 3, 1879.

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WHY spend money to drill holes—and then spend more money to plug them up with rivets? Why condemn a 40-dollar casting for a 40-cent flaw? Why stick to shop routine that calls for 2-dollar methods on 90-cent jobs? Write today for Bulletins that tell what Oxweld Service is doing in your industry

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5 Everything needed for oxy-acetylene work we supply.

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Incorporated
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Readers of The Welding Engineer will find this index to contain the most accurate information obtainable relating to welding apparatus and supplies. The advertising section includes the principal manufacturers of the United States.

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Commercial Acetylene Welding Co.
Universal Oxygen Co.

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P. F. Willis.

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Note the true circle and the surface of the finished cut. In the upper illustration, the small, portable, motor-driven Radiagraph is making the circular cut in one revolution, at a speed of 6 inches per minute. The 30 inches diameter of the flue sheet is the inside diameter of the flange. The outside diameter of the flange is 45 inches, which was first cut. The lower illustration gives a larger view of the Radiagraph in position after the cut was finished, the flue sheet being slightly raised above the flange.

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"Davis Apparatus" combines the widest and most complete range of equipment for Oxy-Acetylene and Oxy-Hydrogen cutting and welding, including acetylene, oxygen and hydrogen generating and compressing systems, mechanical cutting and welding apparatus, hand cutting and welding outfits—portable and stationary, field and shop equipment. It "leads the world" in range, efficiency, and number of successful users. Adopted by the U. S. Army and U. S. Navy Yards. Apparatus and supplies for the largest installations or for the one-man outfit, of equal efficiency.

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WELDING APPARATUS
See also "Torches."

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Wilson Welder Metals Co., Inc.....Front Cover

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International Oxygen Co.

WELDERS' GOGGLES
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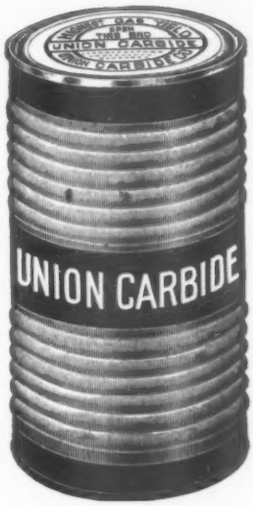

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For Oxy-Acetylene Welding Plants

Contractors' Flare Lights, Torches and Private and Municipal Lighting Plants

"Union Carbide" is packed in 100-lb. blue and gray drums marked conspicuously, "UNION CARBIDE."

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2 x $\frac{1}{2}$ in. —a medium size.

$\frac{1}{4}$ x 1/12 in. —finely crushed size.

Union Carbide in the Generator sizes above listed will be shipped direct to consumers from a **Union Carbide Sales Co.** warehouse at any one of the following points where large stocks are kept on hand:

ALABAMA
Birmingham—1916 Morris Ave.
Mobile—16 S. Commerce St.
Montgomery—114 N. Perry St.

ARIZONA
Phoenix—42 S. Central Ave.

ARKANSAS
Fort Smith—109-123 So. Ninth St.

CALIFORNIA
Fresno—932 H St.
Los Angeles—639 Gibbon St.
Sacramento—1523-31 Front St.
San Diego—326-336 Fifth St.
San Francisco—Kohl Building.

COLORADO
Denver—Nineteenth and Wazee Sts.

CONNECTICUT
Hartford—412 Trumbull St.

DISTRICT OF COLUMBIA
Washington—Maryland Ave. and 9th St., S. W.

FLORIDA
Jacksonville—515 W. Bay St.
Tampa—107 Madison St.

GEORGIA
Atlanta—Cor. Haynes and Rhodes Sts., P. O. Box 1594.
Savannah—Ogeechee Canal, South of Bay St., P. O. Box 78.

ILLINOIS
Chicago—Peoples Gas Bldg., Michigan Blvd.
Decatur—133-147 W. Williams St.
East St. Louis—600 Walnut Ave.
Peoria—100-110 Edmund St.
Monmouth—124 E. Archer Ave.
Marion—315 S. Granite St., Box 747.
Quincy—222 S. Eighth St.
Streator—702 East Elm St.

INDIANA
Evansville—1601 Illinois St.
Indianapolis—110-112 S. Alabama St.
Terre Haute—921 Wabash Ave.

IOWA
Des Moines—117-119 Fifth St.
Dubuque—8th and Washington Sts.
Ottumwa—207-9-11 S. Washington St.
Sioux City—925 Fourth St., P. O. Box 398.

KANSAS
Pittsburg—109 W. Third St.
Salina—154 So. 5th St.
Wichita—721 Beacon Building.

KENTUCKY
Louisville—126 E. Main St.
Middlesboro—1701 Cumberland Ave.

LOUISIANA
New Orleans—819-21 Julia St.

MAINE
Portland—11 Exchange St.

MARYLAND
Baltimore—19 E. Lombard St.
Cumberland—1 N. Liberty St.
Salisbury—Opp. Fulton Station.

MASSACHUSETTS
Boston—(See Cambridge "A.")
Cambridge—241 Albany St.
Springfield—Napier St.

MICHIGAN
Detroit—Grand River and Lorain Ave.
Grand Rapids—500 Shawmut Ave., N. W.
Hancock—First National Bank Bldg.
Iron Mountain—215 E. A St.
Jackson—172 South Water St.
Saginaw—1330 No. Michigan Ave.
Sault Ste. Marie.

MINNESOTA
Minneapolis—334 N. First St.
Virginia—413 Chestnut St.

MISSISSIPPI
Vicksburg—1312 Washington St.

MISSOURI
Kansas City—1316-1318 W. Eighth St.
St. Joseph—920 S. Sixth St., Sta. "A."
St. Louis—(See East St. Louis, Ill.)

NEBRASKA
Omaha—1007-9-11 Jones St., Union Sta. P. O.

NEW JERSEY
Camden—West and Clinton Sts.
Jersey City—554-56 Henderson St.

NEW YORK
Albany—Montgomery and Colonie Sts.
Binghamton—21 Jarvis St.
Geneva—Exchange St. and Railroad Pl.
Jamaica—11 New York Ave.
Kingston—O'Neil St., near Broadway.
New York.
Niagara Falls.
Poughkeepsie—Smith St. and N. Y., N. H. & H. R. R. Tracks.
Roscoe.
Utica—135 Hotel St.
Watertown—438 Court St.
Whitehall—22 Main St.

NORTH CAROLINA
Wilmington—Room 16 Masonic Temple, 13 N. Front St.

NORTH DAKOTA
Fargo—17 Broadway.

OHIO
Cincinnati—67 Plum St.
Cleveland—601 The Citizens' Building.
Columbus—330 Dublin Ave.
Dayton—812-828 E. First St.
Lima—338 East High St.
Steubenville—The John C. Fitzsimmons Lubber Co., 324-343 North Seventh St.
Toledo—414 S. Erie St.
Zanesville—Main and Second Sts.

OKLAHOMA
Oklahoma City—27-29 E. Grand Ave.
Tulsa—1—11 No. Boulder St.

OREGON
Portland—Fifteenth and Hoyt Sts.

PENNSYLVANIA
Beaver—359 Beaver St.
Du Bois—Webber Ave. and Franklin St.
Erie—1426 Chestnut St.
E. Greensburg—Clark and George St.
Harrisburg—627 Walnut St.
Johnstown—Messenger St. & B. & O. R. R.
Pittsburgh—1202 Chamber of Commerce Building.
Pottsville—Railroad and Sanderson Sts.
Scranton—Penn Ave. and Vine St.
Shamokin—5th and Walnut Sts.
Williamsport—Canal and Court Sts.

SOUTH CAROLINA
Charleston—153 Church St.

TENNESSEE
Chattanooga—627 Volunteer State Ins. Bldg.
Knoxville—426 West Depot Ave.
Memphis—671 South Main St.
Nashville—105-107-109 Broadway.

TEXAS
Dallas—802-810 Cadiz St.
El Paso—900 E. Overland St.
Houston—Baker and Cedar Sts., Box 745.
San Antonio—Cor. Leal and N. Salado Sts.
Waco—13th and Mary Sts.

UTAH
Salt Lake City—118 W. Second South St.

VIRGINIA
Lynchburg—1324 Commerce St.
Norfolk—513 Front St.
Richmond—18th and Cary Sts.

WEST VIRGINIA
Bluefield—195 Roanoke St.
Charleston—Broad St. and K. & M. R. R.
Fairmont—"A" Street.
Huntington—820 3rd Avenue.

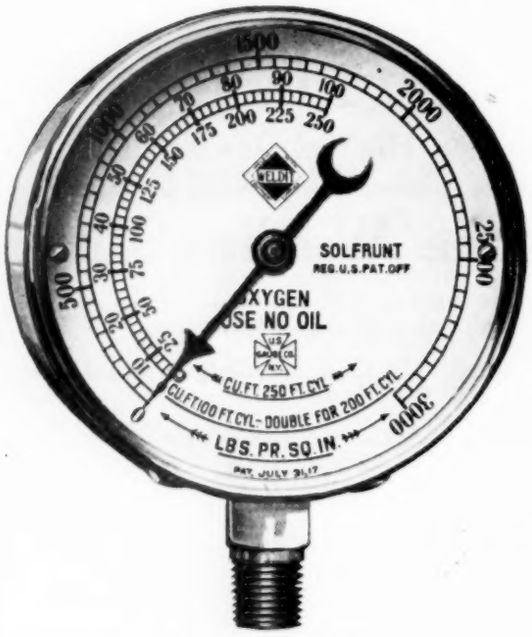
WASHINGTON
Seattle—1102 First Ave.
Spokane—646 Peyton Building.

WISCONSIN
La Crosse—Front and King Streets.
Madison—513-19 Williamson Street.
Milwaukee—120-134 Jefferson St.

We recommend our customers to **select** from the list, the **city** from which the quickest delivery and lowest freight rate can be obtained, and **address their orders to "Union Carbide Sales Company"** at the distributing point selected **accompanied by remittance.**

Please address request for information or special correspondence to either the New York or Chicago office.

SAFETY FIRST



Patented July, 1916

OXY-ACETYLENE GAUGES

for

WELDING and CUTTING APPARATUS

United States Gauge Co.

67 Wall St., New York

WORKS:

Sellersville, Pa.

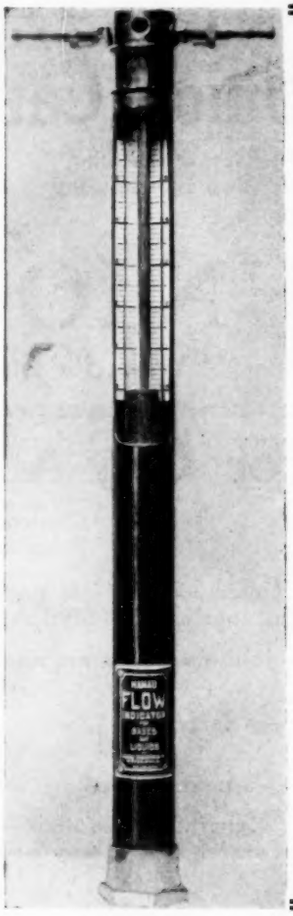
BRANCHES:

Clark St. Bridge
Chicago, Ill.

42 W. Larned St.
Detroit, Mich.

681 Market Street
San Francisco

Board of Trade
Montreal, Can.



Increase efficiency!

Improve quality of work!

Save time and gas!

Reduce the scrap pile!

Use the

"HYDREX FLOW INDICATOR"

(Pat. Pend.)

It permits to set the flame properly for each torch, tip or special work.

It indicates consumption of any gas by simple reading.

It is reliable, foolproof and easily applied.

Write for further information.

Hydrex Engineering Corporation
Hutchinson Bldg., Buffalo, N. Y.

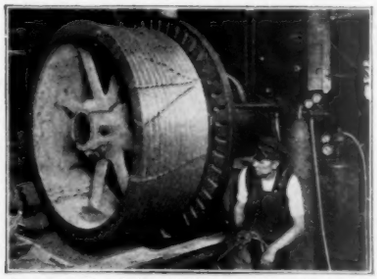
IMPERIAL
WELDING CUTTING EQUIPMENT

You can't afford to use less than the best facilities in your repair work. Imperial Welding and Cutting Equipment is first in Safety, Speed, Economy and Efficiency. Its maintenance cost is low because of the small gas consumption, and a single operation often pays for its cost.

We are headquarters for Welding, Cutting, Carbon Burning and Lead Burning Equipment and Supplies of all kinds and ship on short notice. Write for the Imperial Catalog and full, detailed information regarding methods of operation, economies effected, etc.

IMPERIAL BRASS MFG. CO.

522 S. Racine Avenue CHICAGO, ILL.



Large rope drive pulley broken in seven pieces. Welded with Imperial Equipment.

Universal All-Steel Welding Truck

A time-saver and convenience which no progressive welding shop can afford to be without. Made in two sizes; to carry two 100 ft. drums, and to carry two 200 ft. drums.

Truck is equipped with torch hooks on which the torch can be conveniently placed when not in use, and a ten hole tip rack. The welding rod supply box is made to carry eight pounds of welding rods. The supply case, spaced off into compartments, will carry two one-pound cans of flux, cutting tips, adaptors, goggles and wrenches.

The truck has a hand wheel drum tightening device, strongly constructed, and so made that the drums are held tightly, eliminating any shaking when the truck is in motion.

The entire truck is constructed of heavy angle iron, and has a 10 gauge steel platform. It is so constructed that when fully loaded it will balance easily, facilitating rapid transportation. WRITE FOR PRICES TODAY

UNIVERSAL OXYGEN COMPANY : Sheboygan, Wisconsin

Milwaukee Branch, 554-556 E. Water St.

High Silicon Cast Iron Welding Rods

Atlas Quality

Also rods, wires and fluxes for welding all metals. Quality guaranteed.

Prices Cheerfully Quoted.

ATLAS FOUNDRY CO.
IRVINGTON, N. J.

OXYGEN, ACETYLENE and HYDROGEN REGULATORS

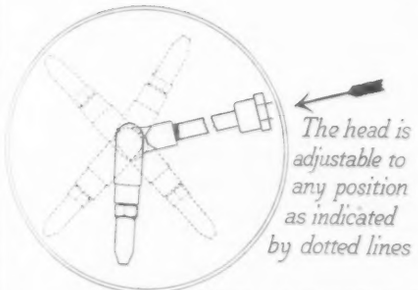
(With or without U. S. Gauges)

Approved by Board of Fire Underwriters

UNIVERSAL REGULATOR COMPANY
775-9 Communipaw Ave., JERSEY CITY, N. J.

Tobin's Adjustable Head

Operates from any position. No loss of time or gases. The nozzle may be moved into any desired position without twisting or rotating the handle or hose.



The head is adjustable to any position as indicated by dotted lines

THE TOBIN ADJUSTABLE HEAD may be attached to any standard welding torch. It is now in successful operation on the Pacific Coast, particularly on Burdett Torches. A constant and uniform flow of gas is assured—no change in your regular torch—simply more flexibility in manipulation. This torch was used on cabinet work on U. S. Destroyers in ship yards, the most inaccessible work being handled with ease. The Tobin Head is equally efficient on heavy work.

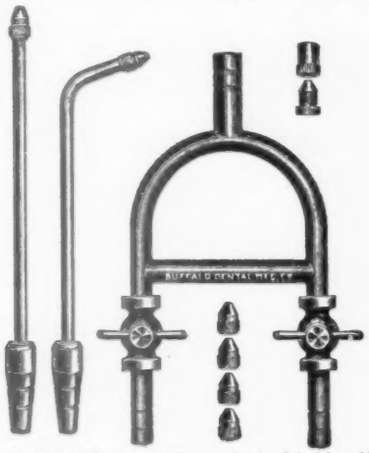
When writing for information send sketch of your torch, showing size of threads.

Write for prices and particulars.

R. J. Tobin Care Western Pipe & Steel Co. RICHMOND, CALIF.

FOR LEAD BURNING

Our No. 28 Oxy-Hydrogen Lead Burner is most complete. Equipped with taps that are ground to a seat, making them easy to manipulate—safety gauzes in the throat of the yoke to prevent accident by a flashing back of flame—a series of jet tips with



varying sized orifices, and a wind shield adjustment to permit its use in draughty places. A straight and curved burner shaft that will meet every possible condition. Price, complete with 5 feet rubber connecting tubing, $7.00. Ask for catalog "B" illustrating and describing this and all our chemical laboratory apparatus.

Buffalo Dental Mfg. Company
Buffalo, N. Y., U. S. A.

Arc welding, adopted to prevent interruptions to war-time production from worn or broken parts, has been retained because of its proven economy and efficiency

Tight Tanks

are Economically Made by G-E Arc-Welding Outfits

ABOUT 1% of the arc-welded tube ends in the tank shown leaked under first hydrostatic test. The leaks were easily welded tight, producing a tank that cost much less than a riveted tank and stayed oil-tight.

The above percentage is usual on a production of 4,000 boiler-plate tanks, involving a quarter of a million feet of arc welding.

This work is readily done by G-E constant energy arc-welding sets which assure a steady flow of metal into the weld at high-operating efficiency.

While your sets are being built by us send your welders and samples of your work to our school at Schenectady. We will gladly train your men to do efficient welding.

43-115

General Electric Company

General Office Schenectady, N.Y.

CANADA CARBIDE SALES COMPANY

INCORPORATED

CALCIUM CARBIDE - FERRO SILICON

CARBIDE PLANTS
CANADA CARBIDE COMPANY
SHAWINIGAN FALLS, CAN.
MERITTON, CAN.

30 CHURCH STREET

NEW YORK

FERRO SILICON PLANTS
SHAWINIGAN ELECTRO PRODUCTS CO.
BALTIMORE, MD.

SOUTHERN FERRO ALLOYS CO.
CHATTANOOGA, TENN.

To All Carbide Users and Distributors:

Gentlemen:-

Just a bit of frankness.

During the war we couldn't supply Canadian Carbide - "More Gas Per Pound" to all who wished it.

Because - Canadian was needed "over seas" to help whip the Boche and did. Early in the war our ally Great Britain accepted the good services of Canadian Carbide and, with each passing month found more for it to do.

1918 found but a trickling supply coming in to the U. S. A., not enough, by far, to go around. And here's where we wish to thank you all for your thoughtful consideration of our problems.

The doleful war days are over for you as well as ourselves; the supply of Canadian is plentiful for our old friends and new.

All warehouses are filled, new ones are springing up, so your orders will be filled promptly and efficiently.

"What will you have?"

Yours very truly,

CANADA CARBIDE SALES COMPANY

VICE PRESIDENT

DWD.B

1918

CANADIAN CARBIDE

MORE GAS PER POUND

ALL STANDARD SIZES

CANADA CARBIDE SALES CO.
INCORPORATED
EXCLUSIVE SALES AGENTS FOR
CANADA CARBIDE CO.
MONTREAL, QUEBEC

• WORKS •
MERRITTON, ONTARIO
SHAWINIGAN FALLS, QUEBEC

• GENERAL OFFICES •
30 CHURCH STREET
NEW YORK

Note the New Extensions at SHAWINIGAN FALLS PLANT

1919

IMPERIAL MUNITIONS BOARD
OTTAWA
OFFICE OF THE CHAIRMAN

LITHOGRAPHIC COPY
OF
ORIGINAL LETTER

2nd December, 1918.

Dear Sirs:-

Referring to your request for a statement from the Board in regard to your Company supplying Calcium Carbide during the period of the War.

I have pleasure in stating that your Company has shown hearty co-operation in meeting the wishes of the Board in supplying important quantities of Carbide for the use of the British Ministry of Munitions from October, 1917 to December 1st, 1918, and further that during this period, at the request of the Board, you have increased your capacity to produce Carbide to an important extent, under conditions that have been disadvantageous to your regular commercial business, and you have continued to supply urgent demands put upon you for strictly war requirements.

Faithfully yours,

Canada Carbide Co.,
Montreal, P.Q.

Chairman

CANADIAN CARBIDE

MORE GAS PER POUND

CARBIDE SIZES

Medium	3½" x 2"
Small	2" x ½"
Nut	1¼" x ⅜"
Pea	¼" x ½"
Miners' Special	⅝" x ⅝"

· Packed in ·

1000 Lb. - 100 Lb. and 25 Lb. *Drums*:
10 Lb. - 5 Lb. - 2 Lb. 1 Lb. *Tins*.

Send for Booklet with this cover

ALABAMA
Bessemer, 2014-2024 Second Av.

ILLINOIS
Belleville.
Springfield, 812-814 E. Adams St.

INDIANA
Rochester.
Terre Haute, 15 N. Eighth St.

IOWA
Albia.
Centerville.
Knoxville.

KENTUCKY
Beaver Creek.

LOUISIANA
New Orleans, Camp and Commons Sts.

MARYLAND
Baltimore, 15 E. Lombard St.
Emitsburg.
Westernport.

MASSACHUSETTS
Boston, 47 Oliver St.

MICHIGAN
Detroit, 343 Bellevue Av.
Saginaw, 204 Forester Temple.

MINNESOTA
Duluth, 3d Av. East and Michigan St.

MISSOURI
Joplin, opposite Postoffice, Lexington.

NEW JERSEY
Paterson, 61-63 Washington St.

NEW YORK
Buffalo, Seneca & Hamburg Sts.
Cortland, 41 Elm St.
Malone, 32-34 W. Main St.
Middletown, 28 W. Main St.
New York City, 30 Church St.
Roscoe.
Springville.
Trumansburg, 55 Main St.
Valley Stream.

OHIO
Barton.
Canton, 1372 Dueber Av.
Cleveland, 3300 Lakeside Av.
Crescent.
Maynard.
Nelsonville.
Salem.
Toledo, 928 George St.

OKLAHOMA
Commerce.
Tulsa.

PENNSYLVANIA
Avonmore.
Barnesboro.
Clymer.
Hastings.
Latrobe.
Nanty Glo.
Pittsburgh, 520 Farmers Bank Bldg.
Portage.
Pottsville, Centre & Market Sts.
Saltsburg.
Scranton.
South Fork.
Wilkesbarre.
Wilpen.

RHODE ISLAND
Providence, 546 Charles St.

TENNESSEE
Knoxville, 761 Asylum Av.

TEXAS
El Paso, 323 S. Santa Fe St.

UTAH
Salt Lake City, 121 W. 2d South St.

VERMONT
Burlington, Park Av.
St. Johnsbury.

VIRGINIA
Onley.
Richmond, 1319 E. Main St.

WEST VIRGINIA
Bluefield, 200-206 Railroad Av.
Charleston, 821 Virginia St.
Clarksburg, 603 Goff Bldg.
Huntington, 1032 Third Av.
Matewan.
Morgantown.
Northfork.

CANADA CARBIDE SALES CO.
INCORPORATED

Exclusive Sales Agents for
CANADA CARBIDE CO.
Montreal, Quebec.
Works
Shawinigan Falls, Quebec.

General Offices
30 Church St. New York

A BEATEN PATH TO YOUR DOOR

"If a man write a better book, build a better house, or make a better mouse trap than his neighbor, though he build his house in the wilderness, the world will make a beaten path to his door."
—Emerson

How does the path to your door look? Is it moss-grown and straggly, or is it broad and well defined—worn smooth and solid by many feet? Look to your front path; it is the index to the state of health of your business. Times change you know; so do methods. The doctor's beard is a relic of the dark ages, and horses are expensive pets kept only by the wealthy.

Preheating With Charcoal Is Passing Along the Way of Discarded Methods

Today the expert welder has something to say to the world. Hundreds of thousands of dollars are being saved with oxyacetylene welding. Men of money and power are bending their ears to the hiss of the welding torch. Are you ready? Is your shop ready?

The Wiederwax Preheater Way

is the swift, sure, safe, clean way of welding. With the WIEDERWAX PREHEATER your work is perfectly done, done in half the time with half the labor, at approximately a quarter of the usual cost. And this is being proved day in and day out by users of the WIEDERWAX. The paths to their doors are well beaten paths.

An astonishingly interesting and valuable booklet is now on the press. It will be ready about April 1st. In it are shown practical examples of welding jobs, how they were done, the cost of the work, practical shop usage—in fact a book that is valuable in welding lessons and knowledge. This book is absolutely free, sent to any address post paid. If you want one reserved—the edition is limited—send us your name and address at once. As soon as your copy is ready, it will be mailed to you.

ADDRESS

THE GEIST MANUFACTURING COMPANY
2001 ATLANTIC AVENUE ATLANTIC CITY, N. J.

PRACTICAL WELDERS

WANT TO KNOW

The Cost of Operation

OF

The Mephisto A. C. Welder

If your rate is 3c per k. w. h. your cost on average work would be under 15c per hour.

Compare this with your oxy-acetylene costs.

You can't disregard a saving of this magnitude.

A portable machine with welding current from 40 to 150 amps., with a tap for intermittent cutting. No regulating apparatus or moving parts, with efficiency of over 90%.

SEND FOR BOOKLET 600

THE ARCWELL CORP.

42 BROADWAY N. Y. CITY

C. P. R. BLDG., TORONTO, CANADA

E. M. NOONAN CO.—PHILADELPHIA
R. L. HUNTER—SEATTLE
F. H. DORNER—MILWAUKEE
STRONG, CARLISLE & HAMMOND—CLEVELAND
PHINEAS H. YORK—INDIANAPOLIS, IND.

We Can Save You Money

ON

GAS AND OXYGEN

USE

WELD-A-CAST
Trade Mark
FLUXES

"Weld-a-cast" is a scientific combination of chemicals, that causes the metal to melt rapidly, shortening the operation, thus economizing in time, gas and oxygen.

"Weld-a-cast" adheres readily to the hot welding rod which picks up just enough and none is wasted; it does not blow away but melts at once; it eliminates blow holes and leaves the metal soft.

Write For Free Samples

CORTLAND WELDING COMPOUND CO.
CORTLAND, N. Y.

Welding Pincers

Use up the short pieces of Welding Metal

This pincer enables the welder to use up his strips of metal almost to the end, all the time keeping his hand a good distance from the heat.

The handle is always cool, no matter how short is the piece of welding metal.

The time saved in welding the strips together quickly pays for the pincers.

Pressing the spring handle releases the jaws to pick up the metal. Length of pincers, 19 inches. Holds rods of 3-16-inch to ½-inch diameter.

Price $1.00

One sent to the address of any welding shop for 30 days' trial, on receipt of $1.00. If not satisfied money will be refunded on return of pincers.

Jobbers and Agents, write

C. SORENSEN

18 E. 16th St. CHICAGO

Aluminum and Cast Iron Flux

AN Aluminum break when melted does not flow together as other metals do, but the edges creep away from each other. There is a film on the surface, dull grey in color. This film is **ALUMINUM OXIDE.** It must be destroyed before your weld can be a success. By using **RED DIAMOND** Aluminum Welding Flux the aluminum oxide is instantly destroyed and the metal assumes a bright silvery appearance. By adding **RED DIAMOND** Flux with the hot welding rod, in the usual way, not only does the aluminum oxide disappear, but dirt and grease as well.

A trial can of **RED DIAMOND** Aluminum Welding Flux will convince you that this is the flux you have been waiting for. Put up in 2 pound cans, $3.00 per can.

The best insurance a welder can have that his welds will be sound and free from craters or blow holes is to use a good flux, made scientifically by chemists who understand the needs of the welder.

The object of a cast iron flux, or in fact any flux, is to eliminate the **OXIDE** and other impurities which form on the surface of the weld, caused by the heat and combination with oxygen of the air. The reactions are the same as in a blast furnace or cupola and flux is used to **CARRY OFF THE SLAG.**

BLACK DIAMOND Cast Iron Flux, when dropped on the molten surface of the weld, instantly clears the metal of iron oxide and other foreign substances, leaving a clear, mirror-like surface, which enables the metal to run together. This condition makes a sound weld.

A very small amount of **BLACK DIAMOND** Cast Iron Flux is required to assure a good weld. The price is a secondary consideration—it's the quality that counts. Put up in 2 pound cans, $1.00 per can.

Chicago Welding Compound Co.

Transportation Bldg. Chicago, Ill.

Our Service Department is at your service. Consult us about your flux troubles.

Swift Oxygen

For Welding and Cutting

Unsurpassed for Quality

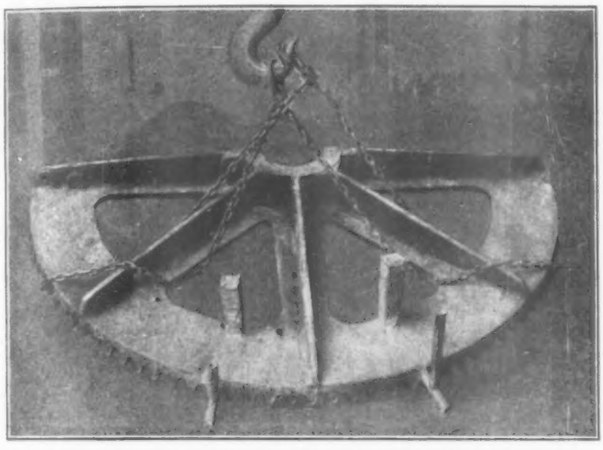
Pure Oxygen Electrolytically Made under the direct supervision of our Chemical Laboratory. It is carefully controlled by chemical analysis, thus insuring the highest obtainable purity.

We carry a large stock on hand—so can fill orders immediately

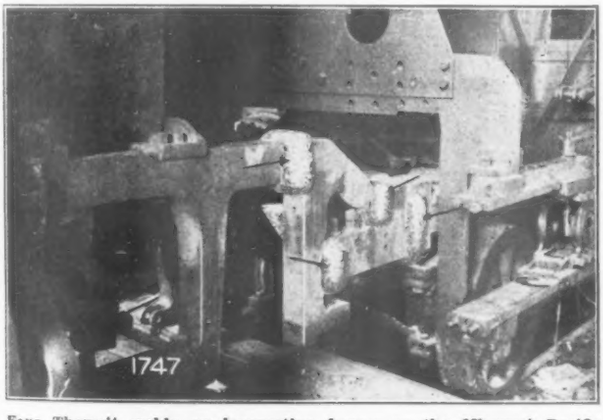
Swift & Company

Oxygen Department **Union Stock Yards, Chicago, Ill.**

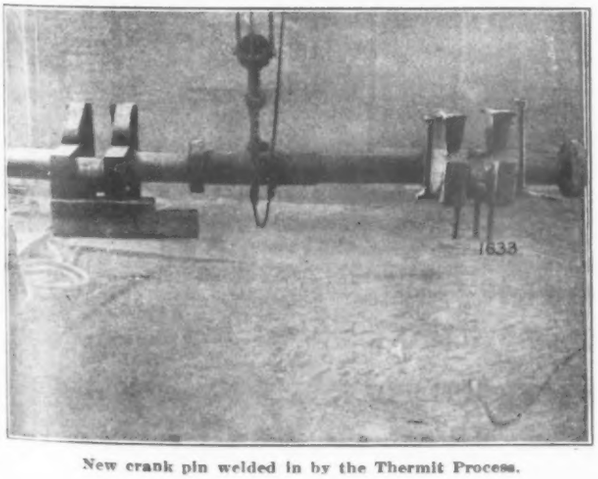
New neck cast on to large roll made with the aid of Thermit and having the pods cast in at the same time.



Large bevel gear on which two new teeth and crack have been repaired.



Four Thermit welds on locomotive frame on the Missouri Pacific Railroad, made without removing the frame from place.



New crank pin welded in by the Thermit Process.

THERMIT

The Only Reliable Process for Welding Heavy Sections

THIS Explains Why Railroads and Steel Mills Used Over One Million Pounds of Thermit in 1917. Also Why 95% of the Railroads in the United States and Canada Having Over 10 Locomotives, Use Thermit for Welding Frames and All Heavy Sections.

There are few machine parts which are subjected to greater strains or more severe shocks than a locomotive frame or a blooming mill pinion. Yet Thermit welds on such parts are being made every day and STAND UP IN SERVICE FOR YEARS. The reason for this is that, unlike ANY OTHER WELDING PROCESS, the steel to make a Thermit weld is produced IN BULK at a temperature of 5000° F. Furthermore, results are not dependent on the individual skill of the operator.

We have ample proof for all our claims and our long list of satisfied customers who come back week after week, month after month, and year after year for MORE THERMIT is a never ending testimonial to the efficiency of the Thermit Process.

Remember that Thermit should not be confused with either oxy-acetylene or electric welding. It stands in a class by itself. It welds sections which cannot be successfully welded by any other method.

Let us tell you more about it. Write for pamphlet No. 1779.

* * * *

Metal and Thermit Corporation

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For over ten years, conservative statements free from deception have characterized our advertisements. Exaggeration has always been avoided. From time to time claims appear that a welding torch has at last been designed which absolutely will not back-fire. Such claims probably are due to over enthusiasm, but they are nevertheless untrue, and the reasoning to sustain them, the crudest sophistry. Any torch will very likely back-fire if the pressure on the acetylene drops to a point where the flow of the gas is below the propagation of the flame. This is one of Nature's Laws. Poorly designed torches will back-fire from other causes.

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Willis Welders are Good Welders. Write us.

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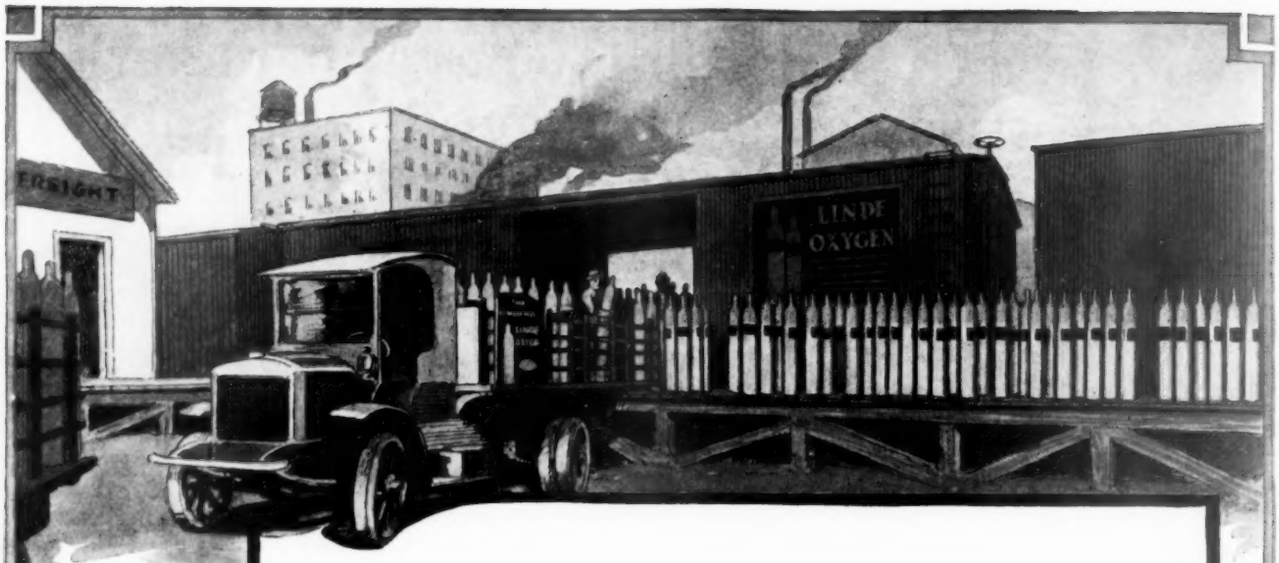
2305-15 N. 11th Street, St. Louis, Mo.



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WELDING IN *the* FROG SHOP

By B. K. Smith

Two of the most modern and efficient devices for the railway maintenance of way shops are the oxy-acetylene torch and the electric arc machine.

There are a great many operations, where expensive articles can be reclaimed from the scrap pile, and for the present the writer will deal with manganese steel frogs, crossings and switches.

Manganese steel is an alloy of iron and manganese containing a considerable proportion of carbon. If there is a very small portion of manganese, the effect is slight. As the proportion of manganese rises above 2.5 per cent the strength and ductility diminish, while the hardness increases.

The contents of manganese in frogs and crossings is about 12 per cent and the metal is so hard that it is very difficult to cut with steel tools. Its toughness increases by quenching from a yellow heat. It has remarkable combination of great hardness, which cannot be lessened by annealing, great tensile strength and ductility.

The principal defects of frogs, crossings and switches, that are practical for welding, are worn intersections only. Before attempting to weld a worn frog or crossing the operator must examine the sire, length and depth of the worn spot, and determine if there is no internal fracture or blow hole. Such internal fractures and blowholes are caused by the impact of modern railway equipment or when casted at the foundry. These blow holes or fractures cannot be seen externally. Generally they are found about one inch below the surface and may extend as long as the worn surface on the face of the rail—that is one cause why such frogs or crossings are wearing so fast on the surface; they are merely subsiding or settling at the impact of heavy locomotives into the space that we call a blow hole. There are some experienced operators in the frog shop that can determine a fracture or blow hole in a frog or crossing by merely examining the worn surface. Others that are not so fortunate, must drill or burn out a small hole about one inch deep on the surface where it is most worn, and if there is a fracture or blow hole, he cannot fail to see it.

A very small percentage of frogs and crossings develop such internal defects and when so defective, they cannot be reclaimed successfully by welding.

The shop superintendent who wishes to reclaim frogs, crossings and switches by autogenous welding should study the various processes which are offered, and use the one which gives him the most advantage.

The principal points to which he should direct his attention are the following: Adapting the best process, cost of operation, selecting the operator, quality of supplies.

We have two processes that are offered in the frog shops: Oxy-acetylene and electric arc welding. Each process is applicable to the work and each have their advantages and disadvantages. The oxy-acetylene process can produce the hardest welds, it is more convenient for portable work on the road, for welding as well as for cutting and enables the operator to hammer and finish the welds. The electric welding process costs less to operate, requires less skill, will not heat the metal to a fusing temperature and such welds will not distort nor crack in cooling.

Cost of operation is a factor which has essentially a different value according to the article to be welded. In the frog shop where it is a question of great saving and serious work, the cost is not an essential factor. Oxy-acetylene welding on a worn intersection of frog or crossing will cost about 25 cents per square inch. Electric welding will cost on an average of 10 cents per square inch for the same operation. The economy of the latter process appears very tempting, but it leaves the metal applied too soft, and it will not give the proper wear for modern equipment. However, in making various tests with the electric arc process, the writer has found a welding rod adaptable for the building up of frogs, crossings and switches for the use of lighter equipment and yard purposes only.

The blacksmith that has spent considerable time in the frog shop will make the best operator for the oxy-acetylene or electric welding processes. However, it is best that he should spend at least 30 days in the erecting welding shops before attempting to weld in his own shop.

The proper welding rod to be used for building up manganese steel is not yet made by any firm. Open hearth rail flange steel, or high carbon steel rods cannot be used satisfactorily because the carbon element is burnt or reduced under the action of the high temperature of the torch and renders the metal too soft. The only successful method in building up of frogs and crossings, is a metal that will remain tough and hard after welding. Such a welding rod can be produced in the frog shop by cutting up a scrapped manganese rail into small strips with the aid of the cutting torch; and then grinding off the burnt edges a little. Even this material, as a rule, will modify its properties, by oxidizing directly or through the reduction of the oxide of the metal in fusion; but so far it has proved to be the only welding metal that will remain tough and hard after welding. In addition to the welding rod, it is necessary to use a cleaning flux in the form of a powder, to be employed on the steel previous to fusion of the metal.

The execution of a good weld depends in a large measure on the arrangements made by the operator in the preparation of the rail. The writer knows two methods of preparation: The water, and the preheating method; the water method consists in placing bodies of manganese in a special made pan about 8 inches deep. The pan is filled with water about ¾ inch below the surface of the rail. In building up the worn surface, the water will prevent the heat from penetrating the whole body, and also prevent deformation or cracks. The preheating method is to raise the whole body to a high temperature, about cherry red, and uniformly cooled after welding. The latter can be performed by burying it in pulverized asbestos or dry sand. It is also necessary with either method to clean the rust or scale of the surface with a wire brush or a portable grinder.

Electric welding process: The only preparation for this process is to clean the surface of all traces of rust with a wire brush or grinder.

Execution of Welds.

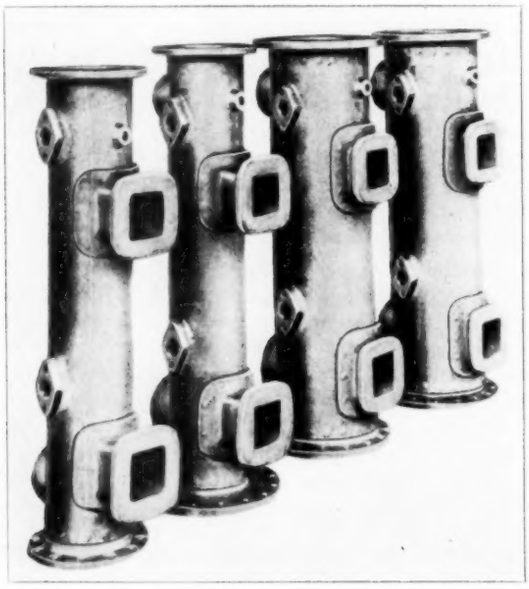
In securing the most adaptable welding apparatus, the operator, proper welding supplies, and the job well prepared, one may consider that he has half of the job done. If the body of manganese is prepared with the water method, then it is necessary to use the largest welding head furnished with the torch. If same is preheated, then a welding head one size smaller should be used. The operator holds and directs the torch on the rail about ⅛ inch above the surface and heats the metal to a slight fusion, about one square inch at a time; then with the extreme end of the welding rod dipped in flux, he directs same on the fused portion of the rail. The flux will immediately clean the oxidation and the melting of the weld-

ing rod should take place at the same time the surface of the rail is fusing. Enough metal should be built on the rail so as to obtain the original thickness. This operation must be confined only to one square inch at a time. Immediately after welding and while the metal is still red hot the operator should hammer the weld until the straight edge will show that the weld is smooth and level with the rest of the rail. The hammering of the weld will serve two purposes: It will leave the surface finished and it will expand the new metal, thus preventing it from cracking. The same operation should be followed in succession without stopping until the operation is finished.

Electric Arc: Before attempting to draw the arc, sprinkle on the surface the hardening compound which will melt and incorporate in the weld. The operator should not start to weld irregular at whatever point the arc happens to start, but he should start at one end, to build up a single layer of metal, the width of the rail and finish at the other end. Having thus deposited the first layer, the operator should clean the surface with a wire brush and deposit some more of the hardening compound and continue the same operation in one layer at a time until the proper thickness is obtained.

NICE WELDING JOB

The welded Exhaust Headers shown in the illustration were Inc., Cambridge, Mass., for the U. S. Navy. Only welding of the highest class could be accepted for the important job on



Welded Exhaust Headers.

which these Headers were used. They took the place of cast iron headers which were formerly used, but were very costly on account of imperfect castings. This is a very good example of what can be done with oxy-acetylene welding.

CRACKSMEN USE TORCH.

This is a day and age when every workman is demanding his rights. In this connection about every trade we know of has set up some sort of a plea for recognition, excepting the cracksmen, and they don't want to be recognized. John Harris, general manager of the Harris Calorific Co., Cleveland, Ohio, is too considerate to permit even the meekest of all our skilled artists to knock on the door for recognition. John hangs a Harris cutting torch on the knob, so that all Burglar Bill has to do is light the torch. However, the man who did this job must have been a beginner. Will somebody please open a cutting school for cracksmen?

This is what a Cleveland paper says:

Lack of time was the only thing that interfered early Saturday with the efforts of scientific safecrackers to get away with Liberty Bonds, thrift stamps and cash to the amount of $11,600.

The cracksmen, using carbo-hydrogen steel-cutting torch instead of the old-fashioned nitroglycerin and fuse, cut their way through a steel door leading to the office of the Harris Calorific Co., 2828 Washington avenue, and cut the combinations from a safe and a strong box. They succeeded in opening the strong box containing nothing but records, and had almost completed the job of forcing the safe when they were compelled to cease operations by the approach of daylight.

"The safe contained $10,000 in Liberty Bonds, $1,000 in war savings stamps and $600 in cash," said John Harris, president of the company. "All were found intact."

The Harris company manufactures steel cutting and welding torches, and the gas used in their operation, so that the robbers found the necessary tools right on the ground.

The cleverness of the cracksmen in manipulating the torch and the gas tanks, Harris said, led him to believe that a former employe of the plant had directed operations. The men gained entrance by a rear door of the factory, cut their way through the steel door blocking their passage to the office on the second floor and then set to work on the safes.

The steel strong boxes were still hot when employes opened the offices at 6 a. m.

FUNDAMENTALS IN AUTOGENOUS WELDING.

The development of both oxy-acetylene and electric methods of welding metals has been rapid during the past few years. In many cases all that was deemed necessary was to place the apparatus in the operator's hands and after a perfunctory course of instruction set him to work with the thought that welding troubles were over. Many roads soon found, however, that there is much to learn in the handling of the apparatus if successful results are to be obtained. Some roads have developed far more rapidly than others and are doing work which has been impossible on other roads. The chief reason for this is that they have given the problem very careful study and have sought to get down to fundamentals. They soon found that in order to get good work and to weld difficult jobs that thorough instruction was necessary and this cannot be over-emphasized, for the possibilities for saving money by these methods of welding are great if they are handled properly.

There appears elsewhere in this issue an article discussing some fundamental facts regarding the oxy-acetylene process, in which it is shown that there are right and wrong methods of handling the torch. Of particular interest is the analysis of the oxy-acetylene flame and how easy it is by the improper manipulation of the flame to make a soldering rather than a welding job; also, how important it is that filler materials of proper characteristics should be used in order to obtain satisfactory work. It is these things that must be carefully studied in the handling of any welding process if success is to be attained. The man who thoroughly knows the subject, knows the materials with which he works and how to get the best results from them, is the one who will make the greatest saving and produce the best work. It is of fundamental importance that this be considered in any attempt to develop autogenous welders in railway shops.—*Railway Mechanical Engineer.*

The Henderson-Willis Welding & Cutting Co., St. Louis, have opened an office in the Unity Bldg., Chicago, in charge of Mr. J. S. Moslank.

LARGEST PACIFIC COAST SHOP.

The largest and best equipped commercial welding plant on the Pacific coast is the plant of Brown Bros. Welding Co., San Francisco. This shop employs from 15 to 30 skilled all-around jobbing shop men to handle the great variety of castings and welding work brought to this shop. Work is done on the principle that 90 per cent of a job depends upon the man, provided he is supplied with the proper equipment.

Brown Bros. are practical mechanics and technical men, who have devoted ten years exclusively to welding, no other activity being connected with the business.

A twenty-ton cast steel scrap iron shear was recently welded. This weld required 168 continuous torch hours and owing to the position of the fracture only one torch could be used; 800 pounds of steel filler rods were used and 19,000 cubic feet of oxygen.

This shop specializes on heavy work and marine work of any description.

The accompanying illustrations are of interest. Fig. 1 shows an interior view of the shop and a six-ton traveling crane. Ten thousand square feet of floor space gives ample room for any job, no matter how bulky. Light work is done on the balconies. The acetylene generators and repair shop for equipment are also located on the balcony. The main offices are located on the main floor, the stock room and equipment room also.

The shop is piped with acetylene, water, low pressure air lines for preheating, city gas, and high pressure lines for chipping hammers.

Fig. 2 shows 25 tons of new castings which were reclaimed. The belt casting hanging on the crane was 12 feet in diameter, 7 feet in height, and weighed six tons.

It was suspended on the crane during the welding operation, so as to prevent it from getting egg shaped from its own weight when heat was applied. A slow heat was taken all the way across the band, although the shrinkage crack only extended half way. Preheating was done with charcoal under the band, and the top was covered with asbestos paper to prevent heat radiation.

The casting in the foreground weighed ten tons.

Fig. 1—Plant of Brown Bros. 10,000 Square Feet of Floor Space Gives ample Room for Any Job.

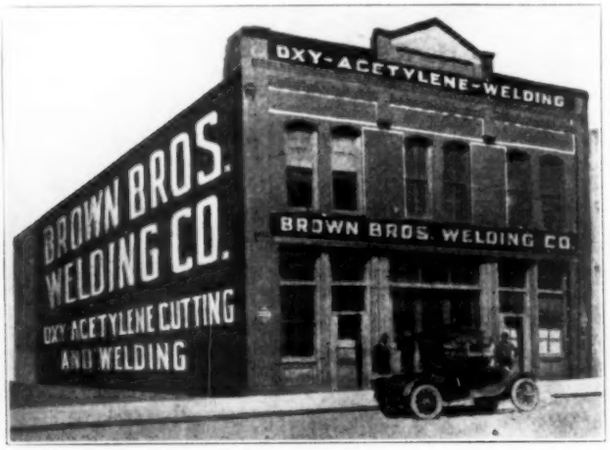
Fig. 3 shows the stationary arc welding equipment, which consists of a 400 ampere General Electric motor generator set and auxiliary panels.

Fig. 4 shows a 15-kilowatt gas engine driven portable arc welding outfit, which has several hundred feet of cable lines so as to be able to reach any part of a ship. The rig is equipped with a hoisting shackle, so that the entire outfit can be hoisted aboard ship or cars if necessary. It is equipped with an air compressor to supply air for chipping and scaling and will supply two arcs.

Fig. 5 shows a resistance butt welder which will electric butt weld 2½-inch standard pipe or 1½-inch solid round stock.

Fig. 6 shows a six-ton rudder which was saved by arc welding, 225 pounds of steel filler rods being used on the job. A new rudder was the only other solution for this job.

Fig. 7 shows a broken guide on a steam hammer. This was acetylene welded, 110 pounds of cast iron filler rods



Plant of Brown Bros. Welding Co., San Francisco, Cal.

was used. The guide was welded two years ago and the hammer has been in service ever since.

Fig. 8 is merely a circular showing the exterior of the shop and portable gas welding equipment. This print was made before the installation of the electric welding equipment.

THE AMERICAN WELDING SOCIETY

Shortly after the United States entered the war, the Council of National Defense appointed an Engineering Committee possibilities of electric welding in shipbuilding. This committee was taken over by the Emergency Fleet Corporation and, as the Welding Committee, later broadened its scope to include gas and thermit welding. When the armistice was signed its investigations were still in progress.

The Welding Committee, by its discussions, researches, lectures and conferences, its interchange with foreign countries, and its dissemination of information, gave a great impetus to use of electric welding in this country.

Concurrently with this work, another move to advance welding, with the emphasis on gas welding, was started by the formation of the National Welding Council, which organization accomplished important results.

Now that industry is again becoming normal, it is desirable that the advance in welding thus begun should be continued and extended into the entire field of joining metals. As the most effective way of accomplishing this, it is proposed to form the American Welding Society.

Objects of the Society

This society will bring together in the manner usual for scientific societies persons from all branches of the industry, who may be interested in any of the welding processes, forge welding, electric resistance welding including spot welding, electric arc welding, gas welding, thermit welding, etc. In addition to this it will have another function which alone would justify its existence. It will create and assist in maintaining a Bureau of Welding which will be a separate organization designed to take full advantage of the principle of co-operation in research and standardization.

Organization

The proposed organization of the American Welding Society, including that of the Bureau of Welding, is shown in the diagram given below and is fully presented in the accompanying constitution and by-laws.

Relation to Existing Societies

From the plan of organization it will be seen that the new society, through the Bureau of Welding, offers to the existing societies, a means for conducting jointly their welding activities which, for efficiency, economy and magnitude of results, exceeds anything that would be practicable for them to accomplish individually. Therefore, the new society should be looked upon as the opportunity for the existing societies to have a common department of welding rather than as an additional society. This intent is fully carried out in the classification for membership by opening to members of affiliated societies membership in the new society at a nominal rate.

Membership

Class A—It is intended that the burden of supporting the new society shall fall principally upon those whose business interests would be advanced by the work of the society. These are clearly the companies that manufacture and sell apparatus and supplies for welding, or that employ welding as a process in their output, or that purchase goods welded in whole or in part and desire to do so intelligently. Their representatives will be known as "Class A sustaining members accredited to corporations" with annual dues of $100. The number of Class A members from the same corporation is not limited. On the contrary, it is expected that the larger companies at least will support the society by as many Class A members as may accord with their standing in the industry.

Class B—The fact that a corporation is represented in the Class A sustaining membership opens the Class B membership with full rights, to others of its employees at annual dues of $20. This class is also intended to provide for any individual not employed by a corporation, consulting engineers, college professors, et al.

Class C—For the benefit of existing societies that become affiliated with this society through the proposed Bureau of

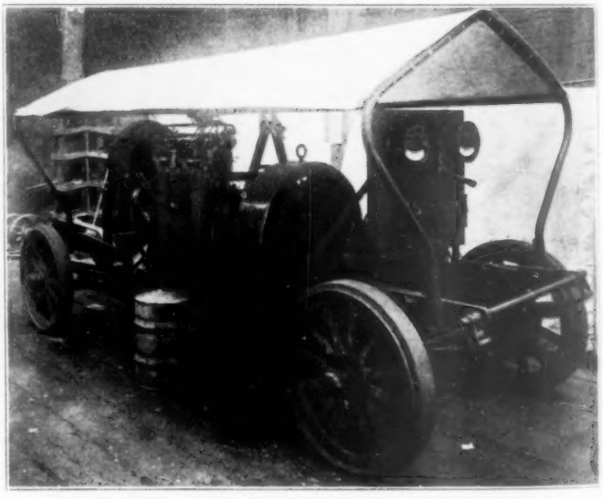


Fig. 4—This Truck a Portable Arc-Welding Outfit. Acts Just Like a Fire Engine in an Emergency. Plant of Brown Bros.

Welding, the Class C membership provides that their members may become associate members in the society at annual dues of $10. These members having their own director participating directly in the work under the arrangement for affiliation, would not need to vote or to hold office.

Class D—Welding artisans may join the society under Class B if they desire, but the Class D membership, with

annual dues of $5, offers them the benefits of the society, other than voting and holding office, at a minimum cost.

Class E—This membership provides for trade associations, putting them in the same category as corporations.

Class F—This class makes provision for honorary members.

Activities of the Society

1. Funds for Research—As a part of its routine, the society will ascertain what specific investigation or assistance is needed in any branch of the industry. If this assistance involves research, a definite program will be arranged and presented to the portion of the industry affected, indicating the benefits to be derived therefrom. The funds which will come from the annual dues are intended primarily to maintain the society, and will obviously not be sufficient for any extensive research. It is the intention therefore to finance each research separately. An investigation desired by the industry will be made, if sufficient financial support can be secured to conduct it efficiently.

2. Researches—Even in the simplest applications of welding investigations are needed because of the great number of variables that affect the quality of a weld. But besides this there is a vast field for welding in the more important structural work where the strength of each member must be subject to calculation, such as, building structures, railroad rolling stock, pressure vessels, boilers, bridges and ships. Therefore, in order to put welding on a more stable basis for all purposes, it is necessary first to ascertain the effect of these variables and to know definitely the conditions under which the best welds may be secured. This involves investigations of which the following may be cited as illustrations:

1. In arc welding a determination of the best current to use with various sizes of electrode and different types of work.

2. A determination of the proper method of procedure in making up both gas and electric arc welds coupled with an adequate system of inspecting the work as it progresses.

3. In arc and gas welding, a determination of the proper angle of bevel and the space to be allowed between plates.

4. In arc and gas welding, an investigation of "electrode" wire and of "welding wire."

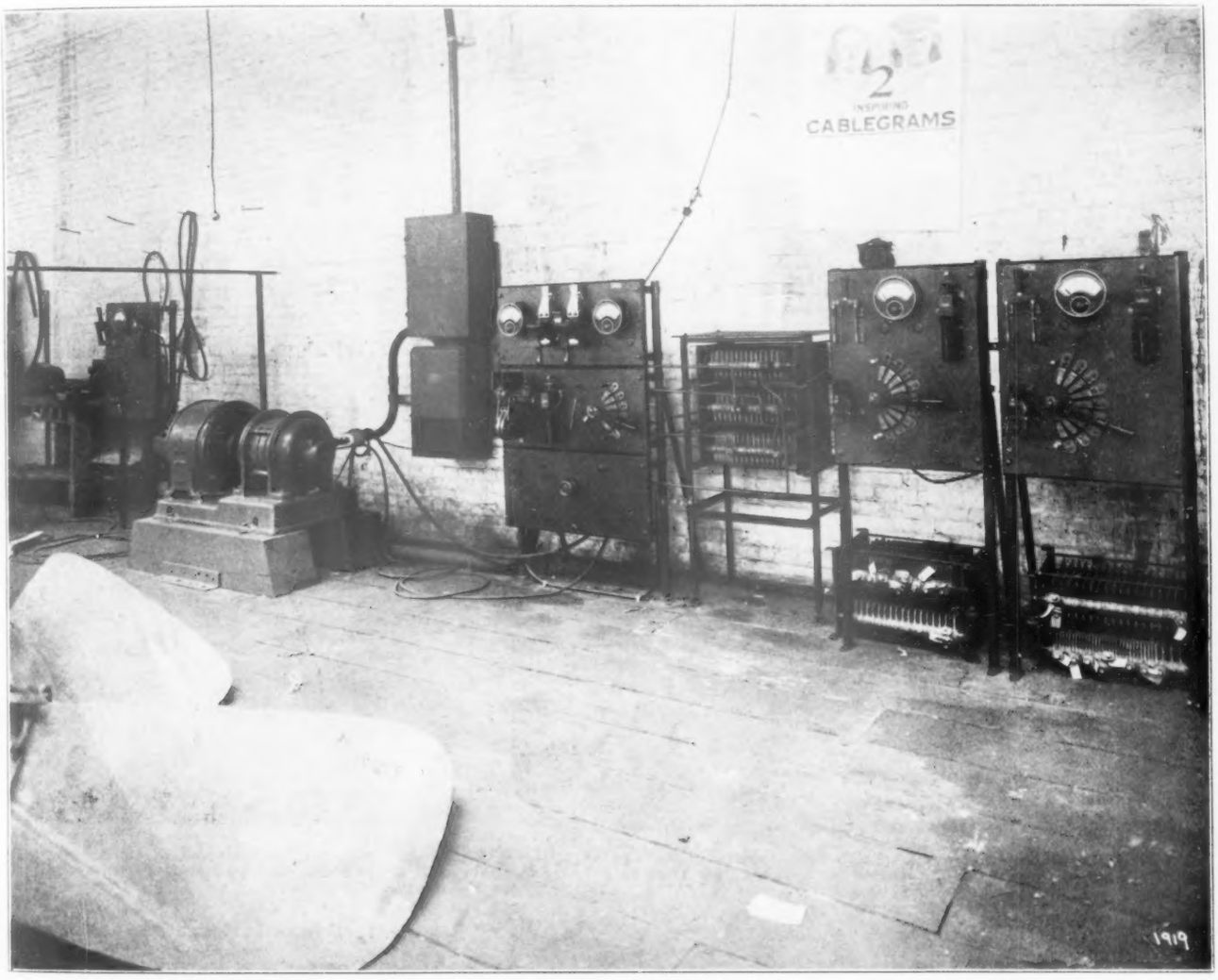


Fig. 3—Plant of Brown Bros. Welding Co., San Francisco, Stationary Arc-Welding Equipment.

5. Further knowledge is desired as to the change in the characteristics of metal caused by welding particularly as affecting its ductility and its action under repeated stresses.

6. In gas, spot, or arc welding, methods of assembling large structures to eliminate initial or locked-up stresses due to contraction on cooling.

7. Investigations to reduce the reactance in long gap spot welders for thick plates such as would be used in shipbuilding; also to determine the minimum safe distance between the welding spot and the spot carrying the return current.

8. Relative value of various forms of joints.

9. Methods of inspecting and testing the completed work.

3. Standardization—The benefits of a proper standardiza-

tion both to the producer and to the consumer, are well recognized. But as some of the manufacturers interested in the new society have expressed fears that standardization might be carried too far, from the commercial point of view, it seems desirable to explain at some length the part which the society and the welding bureau is expected to play in this work.

For some years past numerous overlapping and conflicting efforts in the field of industrial standardization have been carried out by more or less independent organizations, each according to its own method of procedure. There is the need, therefore, of reducing unnecessary effort and of providing uniform methods that will secure, in each case, the co-operation and support of all the organizations whose interests may be effected. To this end there has recently been formed the American Engineering Standards Committee through which it is hoped to gain this co-operation. The method of establishing a standard presented by this committee not only assures that all interested organizations or groups, whether producers or consumers, may participate in the work of creating it, but also requires practically unanimous consent to the standard before it can be issued. It is intended that the work of the new society in standardization shall conform to the procedure established by the American Engineering Standards Committee, and shall be subject to its approval. In fact, a sub-committee of the welding bureau, when formed, will become the sectional committee on welding of the American Engineering Standards Committee.

4. Legislation—In many localities the application of welding to certain classes of structures is now prohibited by law. When the technical work of the Bureau of Welding has demonstrated that such restrictive measures are no longer necessary, it will be appropriate for the society to take steps to have them modified by supplying authentic information that the law makers will respect.

5. Publicity—The society will obtain publicity for its work through the technical press, the publications of engineering societies, and through its own publications, data book, lectures, etc., supervised by its Publicity Committee. The advertising which welding will thus receive should be of great commercial value to all the interests involved.

6. Training of Welders—The investigations of the Welding Committee have thus far shown that one of the most important elements in the success of an autogenous welding operation is the skill of the operator. To secure this, uniform methods of training are essential and the society will take an active part in planning how welders should be trained, and how their proficiency may be determined.

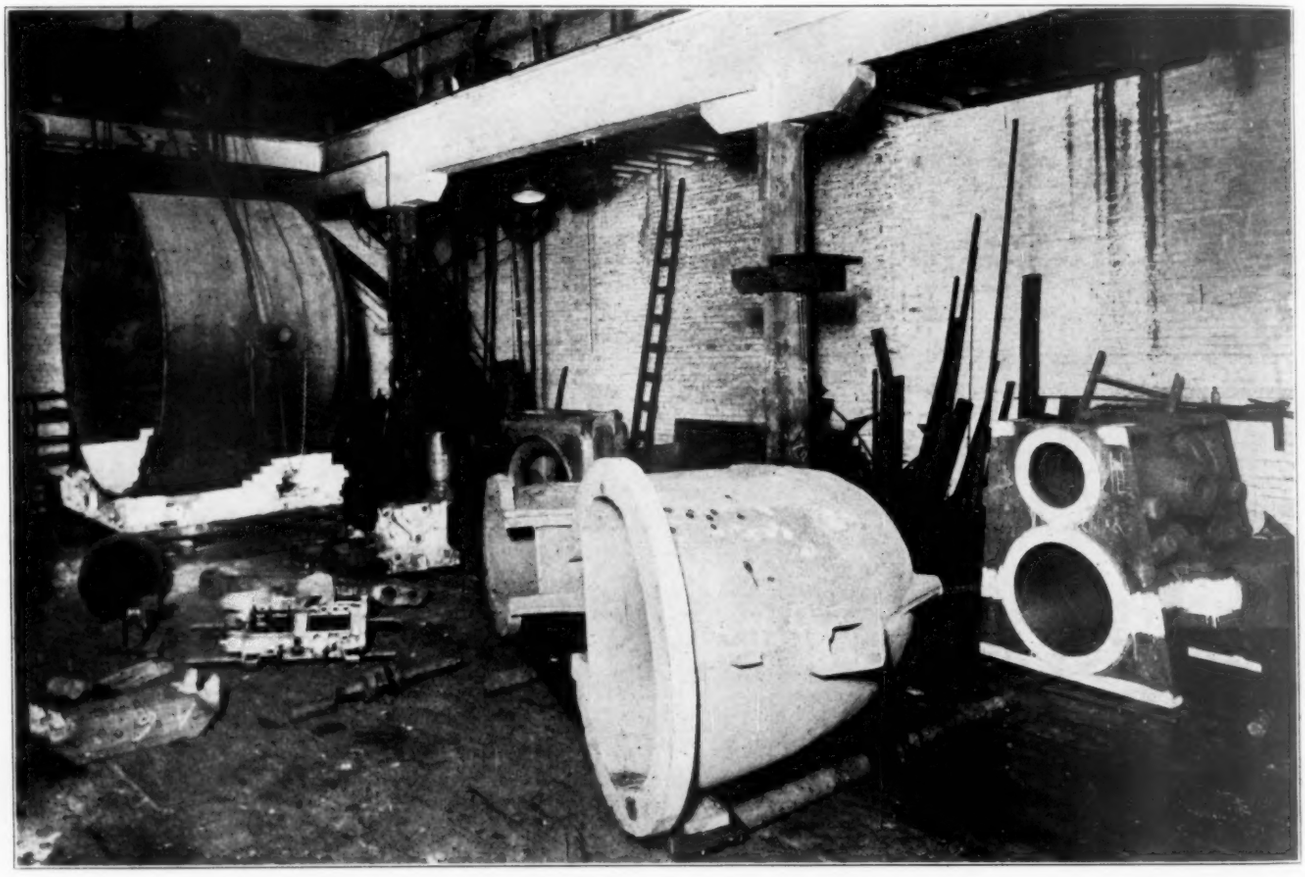


Fig. 2—Plant of Brown Bros. Welding Co., San Francisco. 25 Tons of Castings Reclaimed. Attention Is Directed to the Large Shell in the Background. It Is Suspended by a Crane, So That in Preheating It Will Not Become Egg-Shaped from Its Own Weight.

Relation to Private Investigations

It is the desire of the society to stimulate private companies in their own researches and to aid them by giving them more basic material to work upon and by relieving them of part of the burden. But there is obviously a field best suited to the society although no dividing line can be drawn. For instance, when a broad and impartial quality is needed to make an investigation acceptable as a bisis for legislation, regulations and codes of governing bodies, insurance companies and the like, the society, in the nature of the case, is in a better position to secure it than is any single interest.

Again, for the purposes of standardization, a private investigation, no matter how carefully planned, might not be accepted as complete and conclusive by those having a different point of view from the original investigator. Through the society all those interested would participate in planning as well as in conducting investigations.

Futhermore, a conclusive investigation is often too expensive to be within the range of any but the strongest companies; and even with them it might not be clear why they should carry such a burden alone when the benefits must accrue inevitably to the industry at large.

When the object of an investigation is in any part, to increase the use of welding by increasing public confidence in it, it is clearly within the province of the society. What would be the efficacy of a single company as compared to that of the great engineering societies, the National Research Council, the Bureau of Standards, the army, the navy, the shipping board and other departments of the government, the insurance interests, and others, all working in co-operation with the industry.

The new society will be the means for accomplishing this, whereby all parties at interest may participate directly in co-operative research and may make the conclusions, when agreed upon, their own, and wherein the authority needed will arise automatically.

List of Members.

C. A. Adams, president, American Institute of Electrical Engineers.
D. C. Alexander, Quasi Arc. Weldtrode Co.
Fred Allison, Ford Motor Co.
J. H. Anderson, American International Shipbuilding Corp

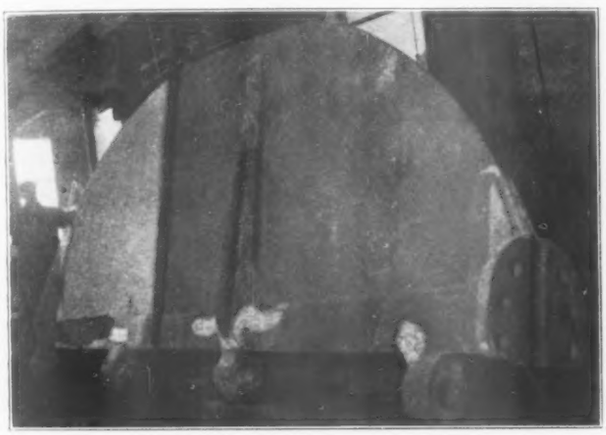


Fig. 6—A Six-Ton Rudder Reclaimed by Brown Bros.

P. A. E. Armstrong, Ludlam Steel Co.
L. K. Atkinson, Air Reduction Sales Co.
J. I. Bahash, International Acetylene Association.
W. M. Beard, Linde Air Products Co.
W. J. Beck, American Rolling Mill Co.
W. T. Bonner, engineer, Welded Ship Construction.
James Burke, Burke Electric Co.
G. L. Brunner, Brunner Manufacturing Co.
Alexander Churchward, Wilson Welders & Metal Co.
*Jack Churchward, Wilson Welders & Metal Co.
C. B. Coates, Chicago Pneumatic Tool Co.
H. J. Cox, Lloyd's Register of Shipping.
Augustine Davis, Davis-Bournonville Co.
L. H. Davis, Linde Air Products Co.
J. H. Deppeler, Metal & Thermit Corporation.
R. S. Drummond, Wilson Welders & Metals Co.
J. G. Dudley, Chester Shipbuilding Co.
E. H. Ewertz, Bethlehem Shipbuilding Corporation.
F. L. Fairbanks, Quincy Market Cold Storage & Warehouse Co.
F. M. Farmer, Electrical Testing Laboratories.
A. D. Flinn, Engineering Foundation.
C. H. Florindin, C. & C. Electric Co.
H. C. Forbes, consulting engineer.
E. J. Henke, Federal Welding Co.
Myron F. Hill, Cast Steel Ship Co.
E. L. Hirt, Bethlehem Shipbuilding Corporation.
H. M. Hobart, General Electric Co.
C. J. Holslag, Electric Arc Cutting & Welding Co.
J. H. Horn, J. A. Roeblings Sons Co.
H. A. Hornor, Emergency Fleet Corporation.
R. G. Hudson, Massachusetts Institute of Technology.
E. S. Hurd, Electric Arc Cutting & Welding Co.
R. P. Jackson, Westinghouse Electric & Mfg. Co.
H. W. Jacobs, Oxweld Railroad Service Co.
Zay Jeffries, Aluminum Castings Co.
Alexander Jenkins, Alexander Milburn Co.
W. J. Jones, Chester Shipbuilding Co.
O. A. Kenyon, Arc Welding Machine Co.
Com. H. G. Knox, Construction Corps, U. S. N.
Hermann Lemp, General Electric Co.
C. B. LePage, American Society of Mechanical Engineers.
J. C. Lincoln, Lincoln Electric Co.
J. F. Lincoln, Lincoln Electric Co.
Thos. H. Litle, Lincoln Motor Co.
L. D. Lovekin, American International Shipbuilding Corp.
W. G. Lyon, Massachusetts Institute of Technology.
John Martin, American Bureau of Shipping.
Victor Mauck, John Wood Manufacturing Co.
J. R. McAllister, New York Central R. R. Co.

Fig. 5—Brown Bros. Plant. A Resistance Electric Butt Welder. It Will Weld 2½-in. Pipe or 1½-in. Solid Round.

C. A. McCune, Page Steel & Wire Co.
*G. H. Clevenger, National Research Council.
W. L. Merrill, General Electric Co.
H. C. E. Meyer, American Bureau of Shipping.
S. W. Miller, Rochester Welding Works.
*H. D. Morton, Automatic Arc Welding Co.
W. J. Murray, Electric Arc Cutting & Welding Co.
M. J. O'Connell, Federal Shipbuilding Co.
J. A. Osborn, American Car & Foundry Co.
Arthur Parker, New York Shipbuilding Corporation.
W. H. Patterson, Westinghouse Electric & Mfg. Co.
R. T. Peabody, Air Reduction Sales Co.
C. C. Phelps, Oxweld Acetylene Co.
Stuart Plumley, Director Engineer & Research Dept.
C. P. Read, Lincoln Electric Co.
E. J. Rigby, Quasi Arc Weldtrode Co.
M. H. Roberts, Air Reduction Sales Co.
F. A. Rogers, Davis-Bournonville Co.
T. Rumney, Siemund-Wenzel Electric Welding Co.
D. B. Rushmore, General Electric Co.
Thomas Shipley, York Manufacturing Co.
Wm. Siebenmorgen, Consulting Engineer.
A. W. Slocum, University of Vermont.
H. S. Smith, Prest-O-Lite Co.
M. M. Smith, Commercial Acetylene Co.
F. N. Speller, National Tube Co.
D. G. Stanbrough, Packard Motor Car Co.
H. S. Starling, Bureau Veritas.
Bradley Stoughton, American Institute Mining Engineers.
H. R. Swartley, Davis-Bournonville Co.
W. E. Symons, Galena Signal Oil Co.
Elihu Thomson.
F. P. Townsend, Submarine Boat Co.

W. A. Turbayne, U. S. Light & Heat Corporation.
J. A. Ubsdell, Great Lakes Engineering Co.
R. E. Wagner, General Electric Co.

AMERICAN WELDING SOCIETY—CONSTITUTION.

Article I.

NAME.

This society shall be known and designated as the American Welding Society.

Article II.

OBJECTS.

The objects of the society are:

A—To advance the science and art of welding.

B—To afford its members opportunities for the interchange of ideas with respect to the science and art of welding, and for the publication of information thereon.

C—To conduct research into the science and art of welding, co-operating with other societies, associations and governmental departments for the benefit of industry in general.

D—To acquire and dispose of property for the purposes aforesaid.

E—To do all other things incidental or conducive to the attainment of the above named objects, or of any of them.

Article III.

MEMBERSHIP.

Individuals, scientific societies, associations or governmental departments interested in welding are eligible for membership in this society.

Article IV.

GOVERNMENT.

The management of the affairs of the society shall be in the hands of a Board of Directors. The society for the conduct of its affairs may adopt by-laws, rules and regulations not inconsistent with this constitution, and may provide methods for amending or repealing such by-laws, rules and regulations different from the method of amending this constitution.

Article V.

CO-OPERATIVE RESEARCH AND STANDARDIZATION.

In order to further its objects most effectively the society shall provide for the formation of a separate body to be known by some appropriate title, such as the American Bureau of Welding, or the American Welding Committee, for the purpose of joining with other societies, associations and governmental departments in co-operative research and standardization in welding.

Article VI.

AMENDMENTS.

This constitution may be amended by a two-thirds vote of the members voting, expressed orally or in writing, at any annual meeting of the society as set forth by the by-laws, provided a notice stating the proposed amendment or amendments with the reasons therefor and any known objections shall have been sent to each member at least two weeks prior to said annual meeting.

AMERICAN WELDING SOCIETY—BY-LAWS.

Article I.

MEMBERSHIP.

Section 1—Individuals, associations, scientific societies or governmental departments having received the approval of a majority of the Membership Committee shall become members of this society upon the payment of dues.

Section 2—Membership shall be divided into six classes:

Class A—Sustaining members, being individuals accredited to corporations interested in the science and art of welding, with full rights of membership.

Class B—Members, being individuals interested in the science and art of welding with full rights of membership. Class B is not ordinarily open to employes of corporations which are not already represented in Class A.

Class C—Associate members without right to vote or hold office, being limited to individuals who are already members of associations, societies or departments affiliated with this society under Article VIII of its By-laws.

Class D—Associates without right to vote or hold office, being individuals who are welders or welding inspectors by occupation.

Class E—Associate members, being individuals accredited to associations, scientific societies and governmental departments, with full rights of membership.

Class F—Honorary members with full rights of membership.

Section 3—Rejection by the Membership Committee of any applicant for membership in the society shall be subject to review and reversal by the Board of Directors by a two-thirds vote of those present and voting.

Article II.

DUES.

Section 1—The annual dues shall be graded according to the classification of membership as follows:

For Class A members	$100
For Class B members	20
For Class C members	10
For Class D members	5
For Class E members	100

For Class F members there shall be no annual dues.

Section 2—All dues shall be payable in advance and shall cover the calendar year or the portion thereof, prorated quarterly, from the beginning of the quarter in which a member is elected to the end of the year.

Section 3—Funds in excess of those provided by the annual dues, which may be needed for research and other work, shall be secured by voluntary subscriptions to be solicited from its members and others specially interested.

Article III.

OFFICERS, NOMINATIONS AND ELECTIONS.

Section 1—The officers of the society shall be a president, two vice-presidents, a secretary, a treasurer, and twenty-four directors, who shall be members of the society.

Section 2—The president shall be elected by the society for a term of one year, and shall not be eligible for immediate re-election to the same office.

Section 3—At the first meeting the society shall elect two vice-presidents, one to serve until the annual meeting in 1920, and the other to serve until the annual meeting in 1921, as designated by the nominating committee; and at each annual meeting thereafter the society shall elect one vice-president for a term of two years. Vice-presidents shall not be eligible for immediate re-election to the same office.

Section 4—The secretary and treasurer shall be appointed to office by the directors for such terms of office as the directors may determine.

Section 5—At the first meeting the society shall elect twenty-four directors, eight to serve until the annual meeting in 1920, eight to serve until the annual meeting in 1921, and eight to serve until the annual meeting in 1922, as designated by the nominating committee, and at each annual meeting thereafter the society shall elect eight directors for the term of three years.

Section 6—At the first meeting of the society a nominating committee of seven members appointed by the chair shall make nominations for officers.

Section 7—Subsequent elections of officers of the society and the nominations therefore shall proceed as follows:

Any member or group of members, except Class C and Class D members, may send to the office of the society nominations for officers. These nominations must be received by the secretary at least sixty days prior to the annual meeting.

From the nominations so received the board of directors shall indicate its choice. All nominations, with the directors' choice indicated, shall be sent to all members entitled to vote, who shall vote thereon by letter ballot.

Section 8—In every case an officer's term of office shall continue beyond the normal date of expiration until a successor is elected or appointed and qualified.

Article IV.

BOARD OF DIRECTORS.

Section 1—The board of directors shall consist of the officers of the society and, in due course, the junior past-president.

Section 2—The board of directors shall have the power:

(a) To manage the affairs of the society, except as otherwise provided by law, or by these by-laws.

(b) To purchase or otherwise acquire for the society any

800 Levin Cells at Paschall Oxygen Co., Philadelphia, Pa.

An Installation of 800 LEVIN OXYGEN CELLS

The Paschall Oxygen Co. write us:—

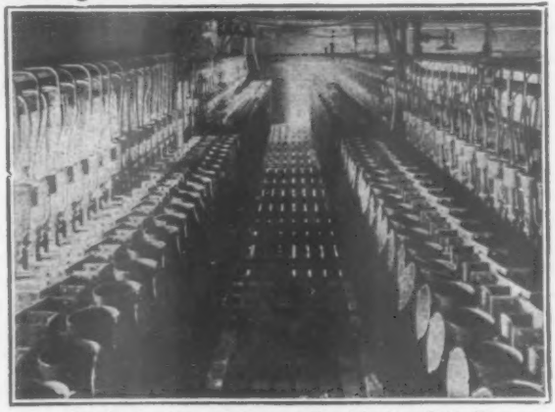
"It gives us pleasure to advise you that the installation of 800 Electrolytic Cells made by you has been performing satisfactorily and meeting every claim you made for it. The purity of the gas obtained is remarkable."

Letters expressing complete satisfaction are being received from every plant where LEVIN OXYGEN CELLS have been installed.

The plants generating oxygen by the ELECTROLABS system find that the purity is 99.8% or better, that the gas is produced at very low cost, with absolute safety, and that the LEVIN CELLS give unfailing service.

Sellers of Oxygen and Hydrogen Using LEVIN CELLS

Dayton Oxygen & Hydrogen Products Co.
Bettendorf Oxygen Hydrogen Co.
Ohio Chemical & Mfg. Co.
Portland Oxygen & Hydrogen Co.
Southern Oxygen Co.
Paschall Oxygen Co.



300 Levin Cells at General Electric Co., Erie, Pa.

Some of the Consumers of Oxygen and Hydrogen Using LEVIN CELLS

General Electric Co. (Erie)
Brooklyn Navy Yard
Cleveland Wire Division
American Cocoanut Butter Co.
Fels & Co.
Wheeling Mold & Foundry Co.

ELECTROLYTIC OXY-HYDROGEN LABORATORIES

—INCORPORATED—

I. H. LEVIN, Technical Director

Laboratories and Works: Dayton, Ohio

Electrolabs
ELECTROLYTIC GAS SPECIALISTS

General Office: 15 William St., New York City, New York

WELDING AND C

A Torch Tip Basica

Each time the tip of a REGO Model L Welding Torch is changed, the g char chamber is a part of the tip.

Each tip therefore has within it a mixing chamber, the areas of which absolut **both** the right **pressures** of gases and the right **volumes.**

A torch mixing its gases back of the tip must have a series of mixing bers if results, because **no one mixing chamber can deliver the gases at the right ures a** the full range of tip sizes necessary on a torch for general welding purpose

The REGO tip mixture is radically different than any other tip mixture torch heretofore constructed.

In all other tip mixture torches, the oxygen area in the mixing chamber is considerably smaller than the total area of the acetylene orifices. This causes a speeding up of the oxygen as the two gases mix, resulting in a considerably **higher pressure necessary for oxygen** than for acetylene.

This is true both in the so-called injector torches and in the positive pressure or medium pressure types. In the first instance, the acetylene is practically stationary; in the second the acetylene is under some pressure, **but in both types the velocity of the oxygen is used to entrain or siphon the acetylene.**

In the REGO, neither gas is used to aspirate the other. **The REGO is a balanced pressure**—not an equal pressure—and the areas of the mixing chamber are so proportioned that the acetylene is delivered at a pressure **slightly greater than the oxygen.**

Given just a little thought, it can quite readily be seen that this form of construction is ideal.

The theoretical consumption of gases in a welding torch is **equal volumes of both gases.**

With oxygen under a high velocity 3 or 4 or 5 inches away from the point where combustion takes place—that is at the end of the tip—does it sound reasonable to claim that this type of torch can use **equal volumes when the ratio of pressure is three or four or greater to one?**

With the REG the a ly holding it back ming should; whereas r type higher pressure t tylene, —more oxygen w come combustion.

Real results are ed by th

The torch can , beca ing at a speed gre n the **this is not true w s us than the** acetylen

The REGO us tely real economies ar ed in t

Lower pressure ed, a ti 7½ lbs. of oxyge of ace melting the meta t blow

Because no ex gen **steel welds are p** for the reduced to a mini

Time and mon saved use of REGO e t.

There are othe es with

There are no o hes w **the REGO** princip

THE BASTIAN B
WEST AUSTIN AVENUE

TING APPARATUS

Different

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xing bers if it will accomplish the same
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rpose

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n.

ults ar d by the **REGO proportioning of areas.**

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true w es using oxygen under a higher velocity
etylen

GO us lutely equal **proportions** of both gases and
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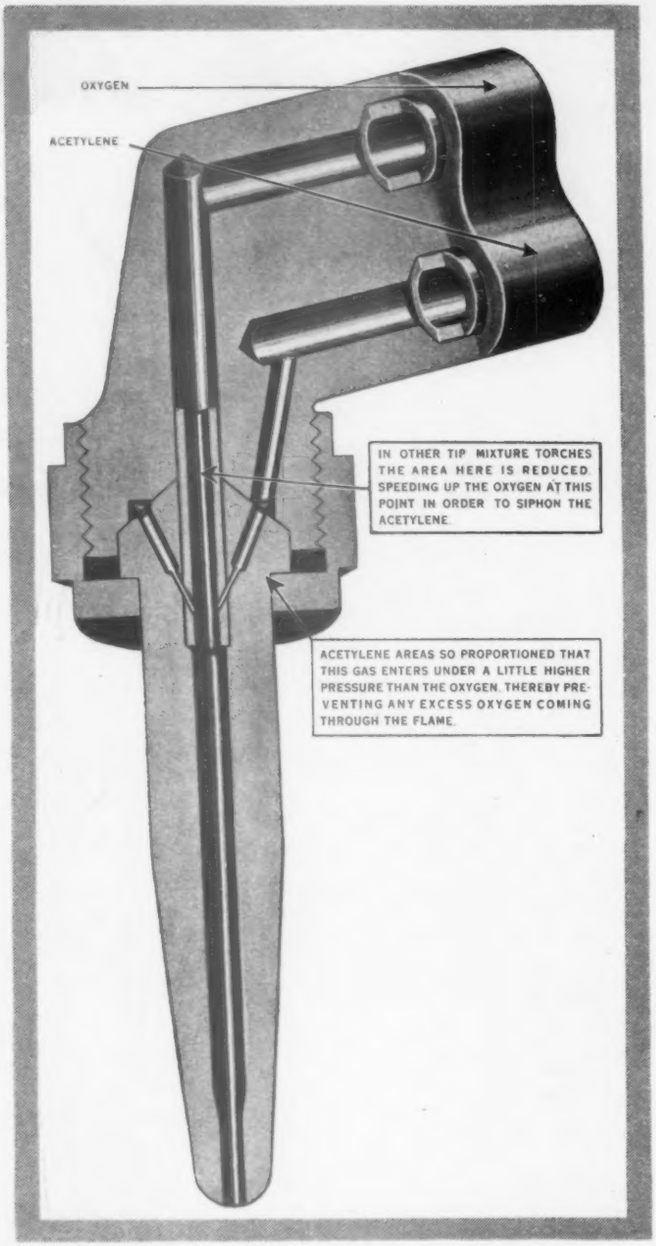
GO e t.

re othe with the gases mixing in the tip.

e no o es with **the gases mixing in the tip with**
princi


OXYGEN
ACETYLENE
IN OTHER TIP MIXTURE TORCHES THE AREA HERE IS REDUCED SPEEDING UP THE OXYGEN AT THIS POINT IN ORDER TO SIPHON THE ACETYLENE.
ACETYLENE AREAS SO PROPORTIONED THAT THIS GAS ENTERS UNDER A LITTLE HIGHER PRESSURE THAN THE OXYGEN. THEREBY PREVENTING ANY EXCESS OXYGEN COMING THROUGH THE FLAME.

BESSING COMPANY
UBAT LA SALLE STREET ✕ CHICAGO.

Apex Walloon Welding Wire

"The Highest Quality Welding Wire Made"

Low Melting Point
Free from Lime or Slag
Every Rod Perfectly Sound
ALWAYS Uniform

Rods packed in 300 lb. boxes
Coils 100 lbs. to a coil

Complete Stock, All Sizes
and Lengths on Hand

Apex Steel Corporation

50 Church Street, New York City **Warehouse, Brooklyn, N. Y.**

W. E

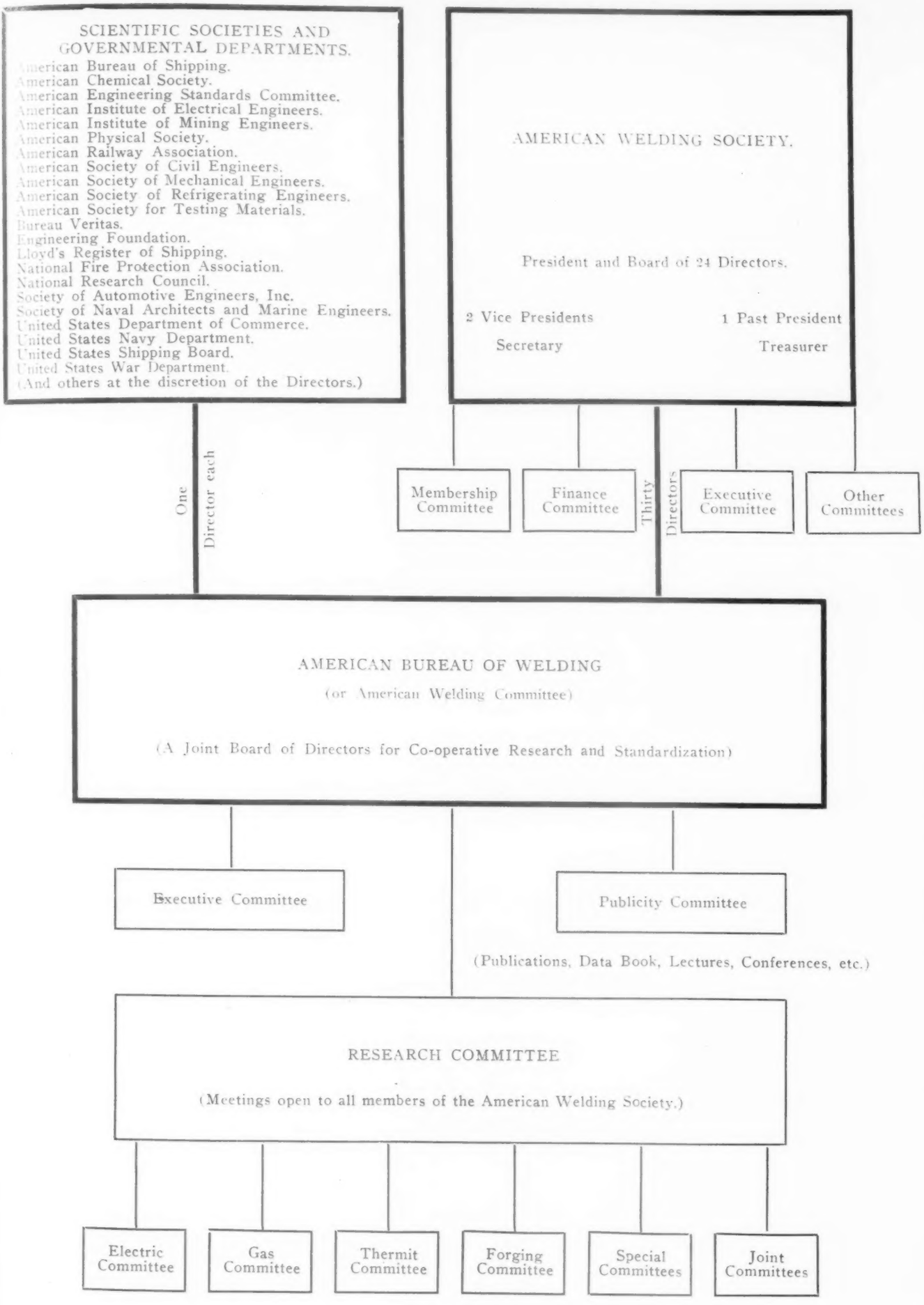
TRIAL OFFER

Apex Steel Corporation
50 Church Street, New York City

Please send us for SERVICE TEST your 8 lb. standard sample package of APEX WALLOON WELDING WIRE, for which we enclose $1.00.

Size..... Length.....

Name..... Address.....


SCIENTIFIC SOCIETIES AND GOVERNMENTAL DEPARTMENTS.
American Bureau of Shipping.
American Chemical Society.
American Engineering Standards Committee.
American Institute of Electrical Engineers.
American Institute of Mining Engineers.
American Physical Society.
American Railway Association.
American Society of Civil Engineers.
American Society of Mechanical Engineers.
American Society of Refrigerating Engineers.
American Society for Testing Materials.
Bureau Veritas.
Engineering Foundation.
Lloyd's Register of Shipping.
National Fire Protection Association.
National Research Council.
Society of Automotive Engineers, Inc.
Society of Naval Architects and Marine Engineers.
United States Department of Commerce.
United States Navy Department.
United States Shipping Board.
United States War Department.
(And others at the discretion of the Directors.)
AMERICAN WELDING SOCIETY.
President and Board of 24 Directors.
2 Vice Presidents
1 Past President
Secretary
Treasurer
One Director each
Thirty Directors
Membership Committee
Finance Committee
Executive Committee
Other Committees
AMERICAN BUREAU OF WELDING
(or American Welding Committee)
(A Joint Board of Directors for Co-operative Research and Standardization)
Executive Committee
Publicity Committee
(Publications, Data Book, Lectures, Conferences, etc.)
RESEARCH COMMITTEE
(Meetings open to all members of the American Welding Society.)
Electric Committee
Gas Committee
Thermit Committee
Forging Committee
Special Committees
Joint Committees

property, rights and privileges which the society is authorized to acquire, at such prices and on such terms and conditions and for such considerations as they think fit.

(c) To appoint executive officers and to fix their salaries.

(d) To determine who shall be authorized to sign, on behalf of the society, notes, receipts, acceptances, endorsements, checks, releases, any and all contracts and other documents, and shall make such authorization.

(e) To perform such other acts as may be necessary to carry out the purposes of the society.

Section 3—In each case of vacancy occurring in the board of directors through death, resignation, disqualification, or other cause, the remaining directors, by letter ballot, may elect or appoint a successor to hold office for the unexpired portion of the term of the retiring director, to be chosen, if possible, from the same society or body, and in the event that a quorum of the board of directors does not exist, the affirmative vote of a majority of the remaining directors shall become effective.

Article V.

COMMITTEES.

Section 1—The directors may appoint an executive committee, which shall have such duties as may be prescribed by the directors to facilitate their work, and such power of the directors as they may delegate to it from time to time.

Section 2—The directors shall appoint annually a membership committee of five whose duties shall be to pass upon applications for membership in this society.

Article VI.

MEETINGS AND NOTICES.

Section 1—The society shall hold an annual meeting in the city of New York, and other meetings at the discretion of the directors.

Section 2—The first meeting of the board of directors shall be held without further notice immediately after the first meeting of the society, and subsequent meetings at the discretion of the board.

Section 3—Notices of all meetings of the society and of the board of directors shall be mailed to their respective members at least two weeks prior to the time of such meetings, except as otherwise provided in these by-laws, and shall state the time and place of the meeting and the principal business to come before it.

Section 4—Twenty members entitled to vote shall constitute a quorum at meetings of the society, and twelve directors shall constitute a quorum at meetings of the board of directors.

Article VII.

VOTING AND PROXIES.

Section 1—Voting by proxy shall not be allowed at any meeting of the society, its board of directors or of any of its committees, except by personal representative.

Article VIII.

CO-OPERATIVE RESEARCH AND STANDARDIZATION

Section 1—In order to provide the means for co-operative research and standardization in welding, the board of directors, in addition to their functions already set forth in these by-laws, shall constitute themselves a separate body, to be known as the American Bureau of Welding; and as such body they shall invite other societies, associations and governmental departments, each to designate a representative for appointment as co-operating director, and shall appoint the representative so designated a director in the American bureau of Welding with full powers.

Section 2—Originally the following bodies shall be invited to designate representatives:

American Bureau of Shipping.
American Chemical Society.
American Engineering Standards Committee.
American Institute of Electrical Engineers.
American Institute of Mining Engineers.
American Physical Society.
American Railway Association.
American Society of Civil Engineers.
American Society of Mechanical Engineers.
American Society of Refrigerating Engineers.
American Society for Testing Materials.
Bureau Veritas.
Engineering Foundation.
Lloyd's Register of Shipping.
National Fire Protection Association.
National Research Council.
Society of Automotive Engineers, Inc.
Society of Naval Architects and Marine Engineers.
United States Department of Commerce.
United States Navy Department.
United States Shipping Board.
United States War Department.

Section 3—The American Bureau of Welding so constituted shall govern itself under its own rules and by-laws, and shall have its own executive head and officers, and at its discretion may extend its membership to other societies, associations and governmental departments, and increase its representation from the American Welding Society.

Article IX.

PERMANENT OFFICE.

Section 1—A permanent office of the society shall be maintained in the city of New York and shall be located in the Engineering Societies Building, 33 West Thirty-ninth Street, or at such other place as the directors may determine.

Article X.

PARLIAMENTARY RULES.

Section 1—Roberts' Rules of Order shall be the governing parliamentary law of the society in all cases not definitely provided for by its constitution or its by-laws or its own rules.

Article XI.

AMENDMENTS.

Section 1—These by-laws may be amended, repealed, or added to, by a majority vote of the members of the society present at any regular meeting or at any special meeting duly called for that purpose.

Section 2—All proposed amendments, repeals or additions to the by-laws which it is desired should be passed upon by the members shall be presented to the secretary of the society in writing at least sixty days prior to the regular or special meeting at which it is desired the same should be considered, and the secretary shall send a notice which shall contain a copy of such proposal to the members of the society at least two weeks prior to each meeting.

Section 3—These by-laws may also be amended or added to by a majority vote of the board of directors, at any regular meeting of the board, or at any special meeting thereof duly called for that purpose.

Section 4—All proposed amendments or additions to the by-laws which it is desired should be passed upon by the board of directors shall be presented to the secretary of the society in writing at least two weeks prior to the regular meeting or special meeting of the board at which it is desired the same should be considered; and the secretary shall send a notice which shall contain a copy of such proposal to the members of the board at least one week prior to such meeting.

Section 5—Any amendment or addition to the by-laws made by the board of directors since the last meeting of the society shall be presented for action at the next regular or special meeting of the society, notice of same being issued to the members in accordance with Section 2 of this Article.

ARC WELDER FOR SMALL SHOPS

The Arcwell Corporation, 42 Broadway, New York, are marketing as a standard product an electric welding machine built for operation on alternating current of any specified voltage or frequency.

It differs from the standard machine, however, in that it is being put out expressly for the use of the smaller machine-shops and garages, its capacity not being sufficient to take care of heavy work on a basis of speed.

It will, however, do any of the work now being done by the standard machine, the only objection to its use in this respect being in the time consumed per operation—that is to say, the machine is expressly for the use of those individuals who have intermittent welding to do, whether on production or reclamation work. This machine sells for approximately half of the selling price of the standard machine, thereby making its purchase practical to the small user. It may be operated on a current cost of about 75c per eight hour day. This apparatus will be an indispensable adjunct to the smaller machine shops and this company is the first in the field with such an apparatus.

The USE *and* MISUSE *of* OXY-ACETYLENE EQUIPMENT#

By C. J. Nyquist†

A FEW years ago various types of small oxygen generators were in use. The Chlorate of Potash type was, no doubt, the most common. More modern and more economical processes for the production of oxygen from air or water are, however, now operated on such a tremendous scale, that there is no general demand or necessity for the so-called chemical oxygen generators, except in places located far away from the large oxygen producing stations. The chief objections, from the safety point of view, to the types of this class of oxygen generators with which I am familiar, is their crudeness and unreliability. Impure chemicals and carbonous materials such as pieces of wood, charcoal or paper mixed with the chemicals used in some of this apparatus, are apt to cause quite serious explosions.

While the largest amount of oxygen consumed for metal welding and cutting purpose is produced by liquefaction of air, the process is, in this country, limited to large charging stations.

Some of the large consumers of oxygen have installed electrolytic oxygen plants, of which there are several types manufactured in the United States. The risk in handling properly constructed electrolytic plants is in disregarding the operating instructions issued by the manufacturer. The plants should be operated by reliable and sufficiently well instructed men, and all use of home-made "improvements" and freak devices should be discouraged. It must be understood that the construction of a reliable electrolytic plant, and for that matter almost any gas producing plant, is an engineering problem and should not be the subject of the ordinary handy man's experiments.

Perhaps the most troublesome part of all high pressure oxygen plants is the compressor. The strain on the machine, packings, charging line, piping and fittings is extremely severe. For pressures up to 2,000 pounds per sq. in. the best compressors made are none too good. And the same applies to the rest of the material that make up the compressing plant. It is the poorest kind of economy to use cheap equipment for high pressure compression; the "safety first" rule is a good one to follow and pays well in the end.

Low pressure compressing plants, practical for individual use, such as compressing oxygen direct into storage tanks at from one to three hundred pounds pressure or for compressing gas drained from the nearly empty oxygen cylinders, are easily operated. A few feet of oxygen per cylinder is no small item in establishments using several hundred cylinders per month. Such a plant, consisting of a gas-holder, a gas storage tank, some piping and a small compressor is comparatively inexpensive and with reasonable care entirely safe to handle.

The "Use no oil" rule applies strictly to the lubricating of all oxygen compressor cylinders and pistons, as well as all other parts of the compressing plant in contact with oxygen under pressure.

The compression of acetylene is a much more serious proposition and should as a rule be left to the manufacturers of dissolved acetylene who have the proper facilities and are in position to give the process the attention and supervision it demands. Some of the U. S. Navy yards are equipped with acetylene compressing plants but they are among the exceptions and are far better able to enforce strict control than the ordinary welding or manufacturing plant. To compress free acetylene in the same manner as oxygen or air is compressed is highly dangerous and absolutely forbidden. The acetylene cylinders must strictly conform to specifications which call for a special porous filling, a definite amount of solvent and safety devices, and the volume of gas stored in the cylinders must be in proper relation to the amount of solvent present at any time and a corresponding permissible pressure applied. The responsible manufacturers of dissolved acetylene do not permit others to fill their cylinders. It is quite reasonable that they should apply and enforce this rule, otherwise the user of the gas would have no protection and the manufacturer of the gas could hardly assume any responsibility in case of accidents.

Acetylene generators are in some respects similar to steam boilers. They need a certain amount of water when in operation; they have safety valves which should be in working order; they are safe and economical in proportion to their construction, their condition, and the care they receive, and a fair amount of intelligence is required to run them.

Some time ago some one advertised a new acetylene generator construction and offered to furnish all the necessary drawings for a very small sum of money. The main part of the contraption was a kitchen boiler. To my way of thinking a kitchen boiler is about as suitable for acetylene generation as for steam generation, in other words, it is useless for both purposes. The kitchen boiler and the milk-can types belong to the so-called "tin can" varieties of acetylene generators, which in past years have caused a lot of grief and have been a detriment to the legitimate acetylene generator business.

For welding purposes only the best acetylene generators are worth having. There are several welding acetylene generators of good construction on the market, but none of them will give satisfaction unless they are handled right. It is not the fault of the generator if the lime is allowed to plug it up, if stuffing boxes leak gas, if connections are loose or if parts are missing. I have seen many orderly generator rooms but I have also seen some that are kept worse than the proverbial pig pen. A man must take pride in keeping up his machinery if he expects it to give good service, and a real acetylene generator is a gas producing machine which requires and should be entitled to both attention and upkeep.

The operating instructions which are furnished with the generators generally contain all the necessary information; the main thing is to follow them. There is nothing very complicated about most acetylene generators used for welding pur-

#Continued from February issue.

†President, Torchweld Equipment Co., Chicago.

poses. The principal parts of the most common types are a water tank, a carbide holder, a gas chamber, the feeding device and the safety appliances. If a man is taking care of a generator he certainly should know how to do it and know the purpose of at least every visible part of it. About the most important part of the operating instructions is that there must be a sufficient amount of water in the generator before refilling with carbide or starting the carbide feed. Generator feed constructions, which permit small water pockets in any part of the feed mechanism with which the carbide can come in contact, are unsafe.

In any acetylene generator, regardless of whether the water is fed to the carbide or the carbide to the water or whether the gas is generated at a pressure of only a few ounces or up to the pressure limit of 15 lbs. per sq. in., the most essential requirement is *cool gas generation.* A hot fire and low water in a steam boiler is apt to cause serious trouble; excessive amounts of carbide and shortage of water may also prove highly undesirable. Personally, I feel sure that an impartial investigation of generator troubles would disclose the fact that most of them are due to overheated gas. Generators must not be operated beyond their capacity. To overwork them is to deliberately invite accidents and damage.

Acetylene is nearly as heavy as air and for that reason it takes a considerable time to clear the generator of gas if opened up for repairs. It is not safe to use an open flame inside the generator, no matter whether it has been left open for hours or days. It is necessary to clean the generator tank thoroughly and to fill it up to overflowing with water in order to be sure that all of the gas is disposed of. The same precaution should be taken if repairs on the generator tank are made which require welding, brazing or soldering.

(To be continued.)

WHAT IS A WELDER.*

Editor: I write this article with the idea of starting something if it be only an argument. It may start a more vigorous one than I realize if you decide to publish it. To get to the point, I want to know "what is a welder?" Is he the man who comes to your shop asking for work as a welder, stating that he has had "seven years" experience in welding, and when told to put a patch in a fire box or weld a boiler section, either states that his experience has been in other lines or fails miserably in the attempt? His "seven years" experience may have been welding tanks, where new steel is used, where there are not the strains to take into consideration, and where all the facilities to make the work easy were at his command.

Technically, there may be no difference between welding and fusing metal with the oxy-acetylene flame, but the writer would not admit that an operator who could fuse metal successfully, would necessarily be classed as a welder. To be a welder an operator must know more than simply how to fuse metal. He must be able to distinguish one metal from another, must know the effects of heat, and the relative melting point and amount of expansion and contraction in each kind. He must know where and when to preheat. He must be able to produce soft welds, that they may be easily machined. He must be able to make vertical and overhead welds, often lying on his back or in cramped positions. He must get into a fire box and weld for hours, enduring intense heat and breathing hot sparks. In a difficult cutting operation a welder will face the back blast of hot gases and metals without flinching. This is a welder's job.

With all due respect to operators on barrels and tanks and similar stock work, the writer facing a storm of protest, will not grant that they are welders. They come under the class of "metal fusers" or simply "metal melters." However, until a man is capable of fusing metal successfully, he cannot hope to become a welder. The writer does not wish to disparage the work of the "metal melter," as his work is sometimes developed to such a degree that it might be properly called an art, and a first-class metal melter with a broader experience will soon develop into a welder.

To get down to bed rock, isn't it time that we should be able to distinguish a "metal melter" from an honest-to-goodness welder? A man is not placed at the throttle of passenger locomotives, simply because he has had "seven years" experience as an engineer on a traction engine, yet a "metal melter" or so-called welder will be instructed to weld a vital part of this same locomotive.

Job welding shops hesitate to hire a stranger who glibly states he is a welder of "seven years" experience, (I use the term "seven years" because so many metal melters seem to have had just this much experience), because the work turned out by them would soon ruin the reputation of the shop. They prefer to hire a green man and teach him themselves. But how often is it that the boss would turn away a man he knew was a real welder, one whom he could trust any job to?

Surely the welding industry is large enough to spend a little time and money for the examination of men who would be called welders. Or else the trade should be influential enough to persuade the legislatures to take charge of the situation and defray the expenses.

When we go to a drug store to get a prescription filled we feel confident that we are going to get what the doctor ordered. Why not provide a means whereby we can have the same confidence in welders? It is not my opinion that every Tom, Dick and Harry should be allowed to handle a torch on important work, which is the case almost universally at this time.

It is true that we hire a man as a machinist because he states he is a machinist, but if that same man could display a badge or card showing he had successfully passed the tests of a responsible examining board, would he not take pride in the fact? This would distinguish him from the ordinary run of poor mechanics and he would be more eagerly sought for. His ability would be unquestioned. Why not give real welders this opportunity?

It might be that an association could be formed that would be able to handle the proposition satisfactorily; and if such an association was formed and the entrance examination a stiff one, it would require a good welder to pass it and consequently the association members would be men of experience. The association would immediately acquire a high standing, and for this reason a large number of "metal melters" would constantly be striving to obtain membership, which would increase their efficiency and make them men keen to become expert welders. In my opinion this would give a healthy stimulant to the business and result in benefit to all.

This idea may be entirely superfluous, but it is a thought I have had in mind for some time and surely there is no harm in voicing my opinion, and I think the proper place is in The Welding Engineer.

Elmer H. Smith, President,
Smith's Inventions, Inc.,
Minneapolis, Minn.

*This is a question which will be taken up by the new American Welding Society.—Editor.

Agents are wanted in every state to solicit subscriptions to The Welding Engineer. Liberal proposition—Write for details.

ARMCO IRON WELDING RODS

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The trade mark ARMCO carries the assurance that iron bearing that mark is manufactured by the American Rolling Mill Company with the skill, intelligence and fidelity associated with its products, and hence can be depended upon to possess in the highest degree the merit claimed for it.

THE old theory that successful welding necessitates a choice of one from many compositions of welding rods was based upon the assumption that welding rods should have exactly the same composition as the material to be welded.

Experience has shown this to be wrong. Seldom is it possible or practical to determine the exact composition of the material to be welded, and even if it were, the melting of the rod and metal in the presence of surface impurities, gases from the torch, etc., so alters the original filler composition that its *true* welding value is *not* the theoretical.

The chemists, metallurgists and research engineers of the American Rolling Mill Co., and the Page Steel and Wire Co., spent years of profound study and experiment in determining the exact conditions existing and the transformations taking place. Their results and actual commercial experience in welding have proven that one composition of rod *in two tempers*, one for oxy-acetylene and another for electric welding, meets every requirement.

The advantage of using Armco Iron Welding Rods of a single composition in two tempers—is obvious. A shop doing general welding work, instead of having to carry stocks of many compositions, can meet all requirements from a small stock of Armco Iron Rods that takes up small space and involves only a small investment.

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30

THE NORTHWESTERN AUTOMOTIVE SHOW.

By C. K. Rickel.

When the doors of the 12th, and largest, Automotive show opened one hour ahead of time February 15th, they admitted a record breaking attendance to the largest show of this kind in the world. Occupying an aggregate floor space of over 284,000 square feet, the exhibits at the Northwestern Automotive Exposition, surpassed in quality and volume anything in the way of Automotive exhibits ever staged in the United States. The 1918 Auto Show at the Overland Building occupied more space than the New York and Chicago Automobile shows combined and the 1919 show exceeded that space by 25,000 square feet.

The show reflected in every way the exhilarating spirit of the postwar period and marked the beginning of a new era in the largest industry of the country. Over five hundred distinctive and separate exhibits covered everything known to the Automotive industry. On the first floor of this large building were grouped the tractors and motor trucks. Every kind and shape from the baby Caterpillar tread "Mule" to the large twenty-ton tractors and from the "Flivver" truck to the big "Ten Tons" with their hydraulic lifts. The many lessons taught by the war were reflected in design and production of these "Iron Horses" and all manufacturers agreed that the peace demand from city and country buyers is already exceeding the war demand.

The second floor housed the passenger cars which were properly groomed for the occasion and formed the most beautiful and picturesque part of the show. But it was the third floor, in the shape of a large balcony one hundred feet wide, that proved to be the Mecca of all visitors for here were located the Accessories which included everything manufactured to satisfy the desires of the car owners, the dealers and the repair men. In the car owner section were shown carburetors, headlights, heaters, horns, vaporizers, locks and countless other devices. In the electrical section many exhibits displayed in addition to domestic devices some that were used in the latest modern warfare.

The large Industrial division had as its leading features, the displays of the leading firms in the Oxy-Acetylene Industry. The Northwestern Welders' Association, whose membership comprises many of the largest commercial welding shops, had a very attractive and instructive exhibit showing the value of Oxy-Acetylene Welding in Automotive repairing and the members on duty were kept busy telling those interested about this process. The Minneapolis branch of the Air Reduction Co., Inc., of Minneapolis had a large and attractive exhibit. In addition to a complete display of welding apparatus and supplies, the United States Welding Company displayed a perfect miniature model of a large Michigan Central passenger locomotive that was built by Ben K. Smith, their Welding Engineer and Shop Superintendent. All parts of this locomotive that were feasible to weld are welded and the locomotive operates under its own steam. As a tribute to the many women who have taken up Oxy-Acetylene Welding and who helped materially during the stress of War Production, another display illustrating their work was arranged. A life-like figure of a "Lady Welder" was continually welding upon a large gas engine block. To complete the exhibit and outline the space a large number of new oxygen cylinders supplied by the Linde Air Products Company were used.

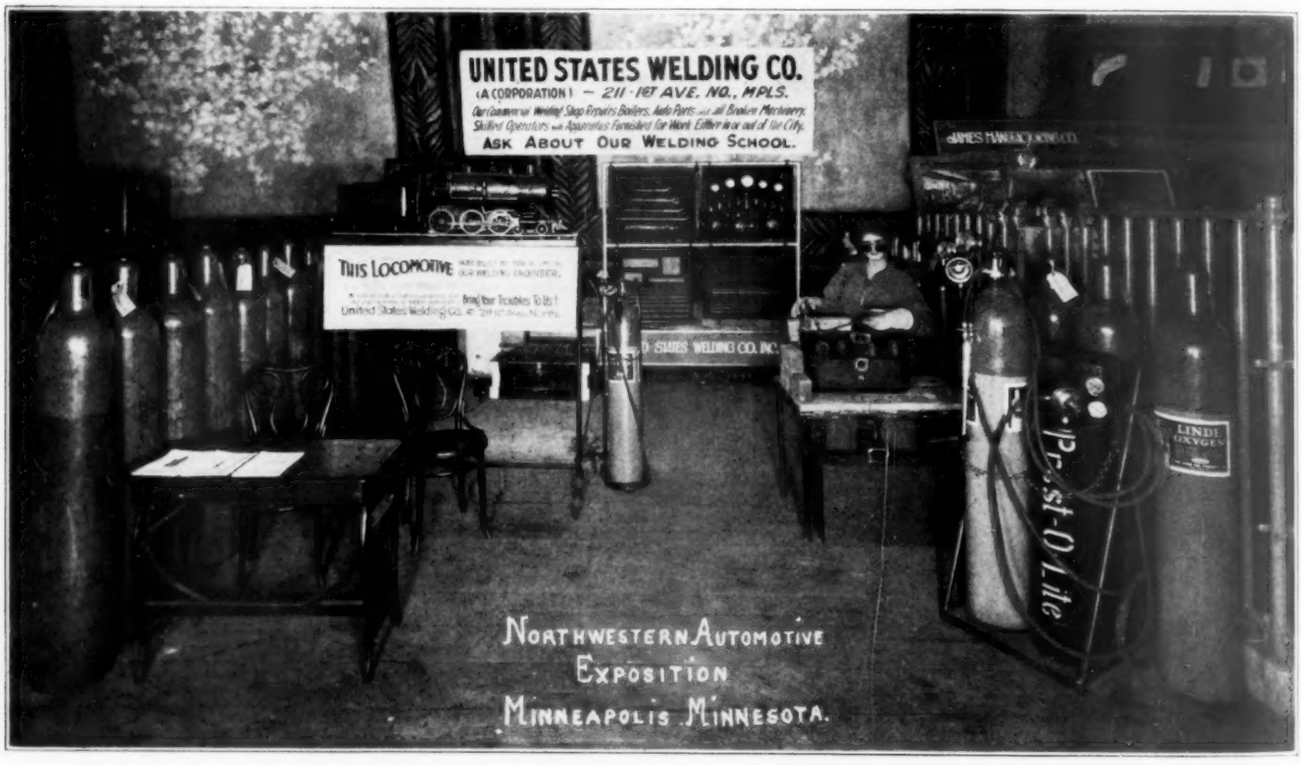

Exhibit of U. S. Welding Co. at Northwestern Automotive Show. Note the Little Locomotive, Welded by B. K. Smith.

Not only in space and in number of exhibits was this show the greatest but every exhibitor showed actual sales and new business far in excess of any other similar affair which is the best indication of all that the Northwest is to continue in its state of prosperity.

When welding manganese steel, to quiet the metal and keep it from foaming, use a very small aluminum wire, introducing it into the weld with the ordinary filler rod. Aluminum is used for this purpose in the foundries.

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The Welding Engineer

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Cutting Up German Guns.

A DISTINGUISHING feature of the forthcoming Victory Loan drive will be the steel souvenir medals or coins which will be distributed to promote the success of the undertaking. The tokens will be manufactured from the steel of guns captured from the Germans by American Doughboys. The guns and their mounts will be cut up by oxy-acetylene torches into charging-box sizes. So, while it was not possible for us to weld the old Liberty Bell, we are at least participating in the celebration.

War Work.

A PROMINENT welding shop tells us that after doing considerable government work for a local company the War Auditing Board made deductions of all Oxygen, Acetylene and Charcoal charged to the work, claiming that these items were not materials, as the finished work contained no part of them. Certainly no Army or Navy Officer, experienced in welding, made this decision. Since we have won the war and can speak plainly, this is but one more instance of where our Government has been tangled up in its own feet. A very short time before the Kaiser left for Holland certain high officers in the Ordnance Department did not know the Ordnance Department had a welding school at Peoria. The idea is this—when you spit on an aluminum crank case, to see if it's hot, don't figure the spit as "material". It costs less than gas but after July 1st it may be hard to do.

Railway Supply Companies Suffer

THERE is no question but what the railway supply companies have been a most important factor in helping to develop efficient and economical railway operation. Now, at a time when it is exceedingly important that the United States enjoy industrial prosperity, these companies are being threatened with disaster. They probably employ almost as many workers as the railways themselves, and on the basis of four dependents to each worker, a very considerable percentage of the entire population of the country will be affected directly and indirectly. * * * The present situation is being caused by the policy of the railroad administration in cutting down purchases to a minimum. The heads of the railroad administration are carrying a tremendous responsibility and doubtless they are fully aware of this situation, but how can they buy materials and equipment if they have no money for this purpose? It would seem that the railroad administration is financially embarrassed and that the only solution is for Congress to come to its rescue and provide sufficient funds to at least put the roads in as good physical condition as they were when they were taken over by the government. It has been intimated that the purchasing department of the administration is holding off to secure the benefit of lower prices. If this is true, then this policy is at variance with that of other departments of the federal government and is open to severe censure, particularly at this time when it is so important that work be furnished to soldiers and sailors returning to civilian life and to workers who have, until recently, been engaged in war work. Some idea of the conditions now existing in the railway supply field may be obtained from the expressions from different supply companies which will be found in another part of this issue.—Railway Age Gazette.

AMERICAN WELDING SOCIETY FORMED.

New Association, the Basis of Which is the National Welding Council and the Welding Committee of the Emergency Fleet Corporation, is Formed.

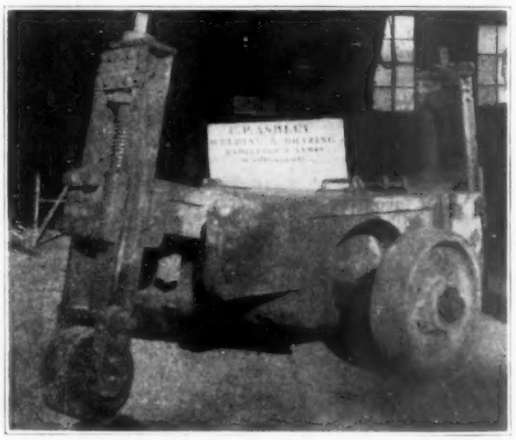
A NEW association, which should do much to place the art of welding on a firm basis in this country, has been formed. The title of the new association is the "American Welding Society," and the secretary is H. C. Forbes, Room 716, 38 West Thirty-ninth Street, New York, N. Y.

A recent announcement says:

"You are invited to join in the formation of the American Welding Society.

"This society will merge with the Welding Committee of the Emergency Fleet Corporation, and the National Welding Council, and will include others who may be interested.

"It is the purpose of the society to become a disinterested and dependable source of information on welding, not only for the benefit of the manufacturers of welding apparatus and supplies, but also to aid those who use welding in their production and those who purchase welded goods.



Welded by C. P. Ashley, Kingston, N. Y.

"The society will give greater stability to welding by standardizing welding processes and thus make its economies available in a wider field of industry.

"The first meeting will be held on Friday, March 28, 1919 at the Engineering Societies Building, 33 West Thirty-ninth Street, New York, at 10:30 A. M. If you cannot attend in person, the receipt of a letter before the time of the meeting indicating the class in which you desire membership, will entitle you to become a charter member of the society."

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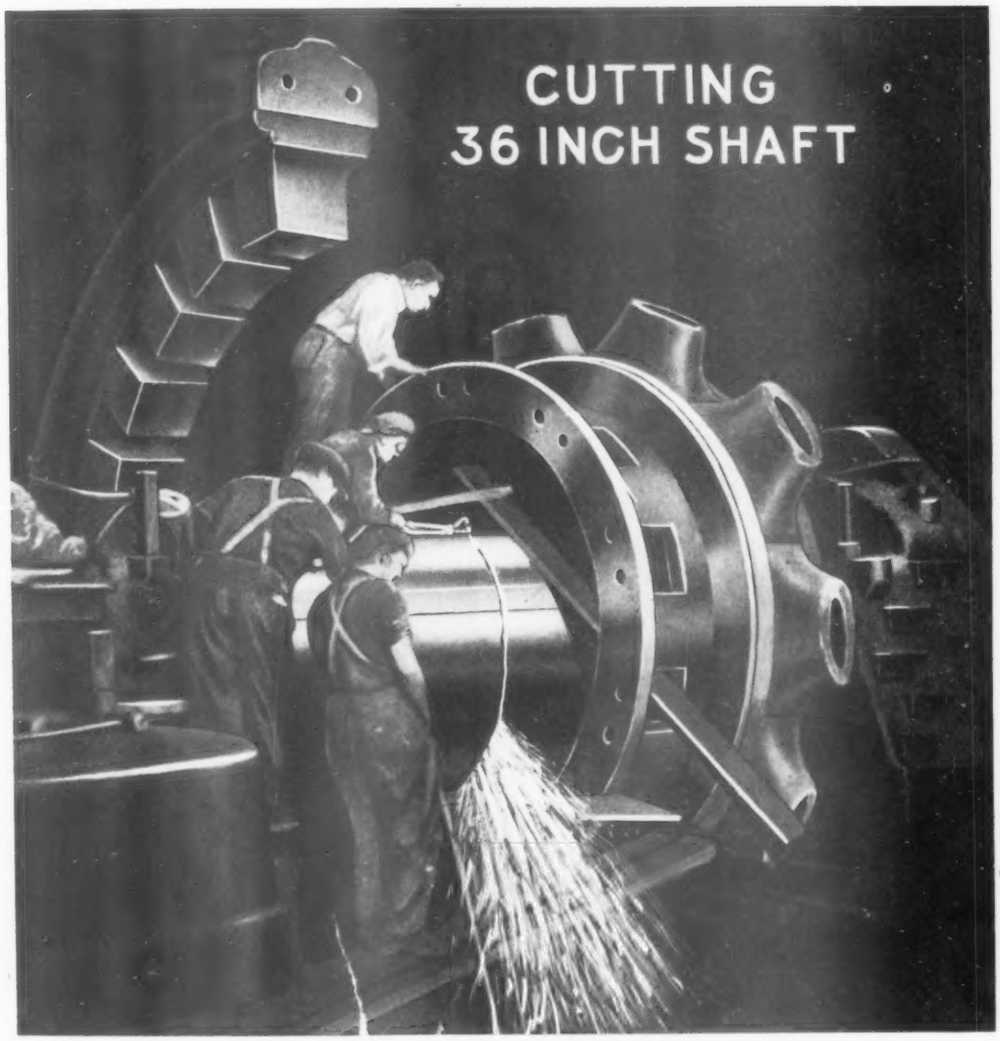


Look at This Picture. It Surely is Remarkable. So Are All the Parts of Our Equipments.

EXPANSION *and* CONTRACTION

Can We Help the Other Fellow Solve His Problems With Our Experience?

By Fred J. Maeurer*

EXPANSION and contraction—two words in the oxy-acetylene industry that have caused more discussion and arguments than all other problems combined—one that the books cannot teach, one that cannot be lectured on intelligently without practical demonstrations, but the one subject that all welders, no matter how busy they are, can find time to discuss in their eagerness to learn.

I have read about all the books devoted to welding and find that this subject is treated in such technical language that ninety-nine welders out of every hundred are ready to give it up as a bad job before they finish reading. For instance, one book will explain it as follows: "In all metals the co-efficient of expansion and contraction is very high,' and in another you will read: "There is no general rule for taking care of expansion and contraction." While this is true, it does not help the man who had tried a number of times to weld a complicated castings and failed, only for the need of a little information, and that information would reach all welders, if the heads of the large shops would send articles to *The Welding Engineer,* discussing how they overcome their various expansion and contraction problems, how they turned what looked like a sure failure into a wonderful success, and by so doing they not only help the welder, but they boost their own trade.

In the shop of which the writer is connected we naturally are confronted with a great many expansion and contraction problems, and the writer will attempt to show how some of them were worked out, and he sincerely hopes that it will be the means of helping some one else.

Now, one of the particular instances that I have in mind offered some expansion and contraction problems that were tremendously interesting, we might say novel, that was successfully worked out and surely changed this one particular problem from what looked like a sure failure into a most wonderful success. This problem came up last summer after we assumed a Government contract for the manufacturing of large steel convertors (Figure No. 1). The shell was 11 feet 6 inches in length, thickness 7/16 inch, diameter of shell was 30 inches, the flange of shell was 45 inches outside diameter, the flue sheet was 45 inches outside diameter, both flange and flue sheet were 2½ inches thick, and into this flue sheet 85 1½-inch steel boiler tubes were to be welded. Outside of the welding of the boiler tubes, which were 3/16 inch thick, to the 2½-inch flue sheet, no trouble whatsoever was encountered, and you will note in Figure No. 2 just how we originally attempted to weld these light flues to the heavy flue sheet, and that is the proposition where expansion and contraction played so vital a part, and I will try to explain why this failure, trying to weld them as shown in Figure No. 2, resulted.

We welded one convertor complete for test and made our welds on the 85 tubes as per Figure B and tested the entire convertor with 220 pounds steam pressure, the pressure being in the inside bottom half of convertor and held the pressure for several hours without any leaks developing, then turned off steam and allowed the entire convertor to cool, when the steam was again put on and instead of being steam tight as

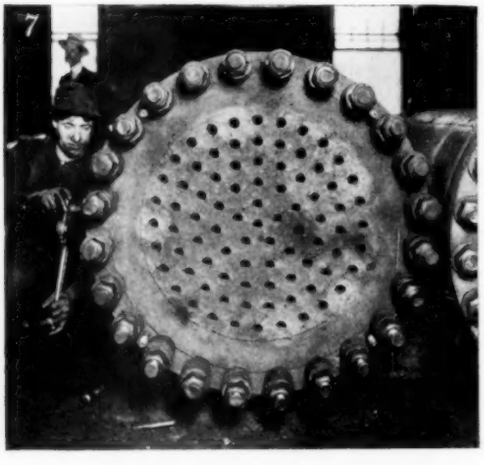


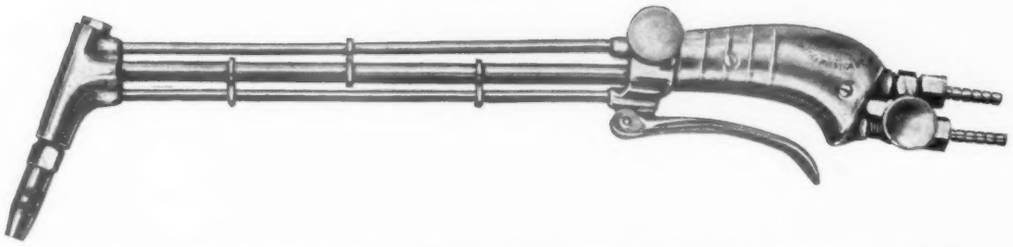
Fig. 5. 85 Tubes Completely Welded.

Fig. 4. Showing Method of Preparation, a Number of Flues Welded and Some Unwelded.

*Supt. Chicago Shop, Davis-Bournonville Co.

Smith's Pistol Grip CUTTING TORCH

No. 8



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Note the long, conveniently located cutting jet lever. When you grip the torch to hold it to its work, you use four fingers to operate this lever. This means smooth, easy control that will not throw the head out of line. The convenient, comfortably shaped handle prevents fatigue.

It is especially good for sheet steel work and cutting special shapes. In cutting risers on heavy steel castings or for scrap cutting, cutting stay bolts, etc., you can't beat it. All cutting tips for Smith's No. 8 Cutting Torch are copper. They are made in different sizes and capacities. Unless otherwise specified, we furnish the No. 2 cutting head which cuts up to three inches.

No. 8 Smith's Pistol Grip Cutting Torch with one head, $50.00.

Extra Copper Cutting Tips:

Sizes 1 to 4 inclusive 2½ inches long each..... $7.50

Sizes 3 to 5 inclusive 3½ inches long, each..... $8.50

Guaranteed: Try this cutting torch in your shop. If, at the end of ten days, you are not entirely pleased you may return the torch either to us or the jobber or dealer from whom you bought it and your money will be refunded.

Write for information on our kerosene pre-heating equipment.

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Manufacturers of the Smith Generator and other Oxy-acetylene Welding and Cutting Equipment

previously we found about 60 per cent of the welds leaked, but upon close examination found the welds intact, but the tubes were cracked or split at the point marked "C," these cracks being caused by the uneven contraction of the flues and sheet; in other words, the flues being lighter metal than the flue sheet, they naturally cooled and contracted a great deal faster than the heavy flue sheet, they being cold and thoroughly contracted while the flue sheet, on account of its thickness and size, retained its heat and was still contracting, setting up a steady pull on flues until the breaking point was reached, the flues then breaking at point marked "C."

It will be noted that the welds are a great deal heavier than the thickness of the flues and that prevented the flue sheet from pulling away from the welds, and these flues naturally broke at the weakest point right close to the welds. We then found that this type of weld did not allow the tube any chance

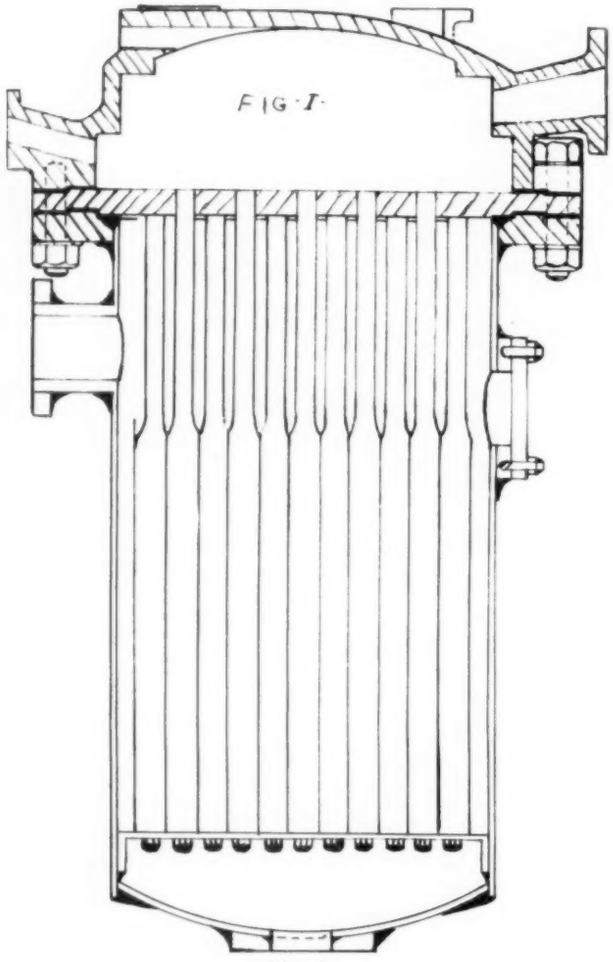


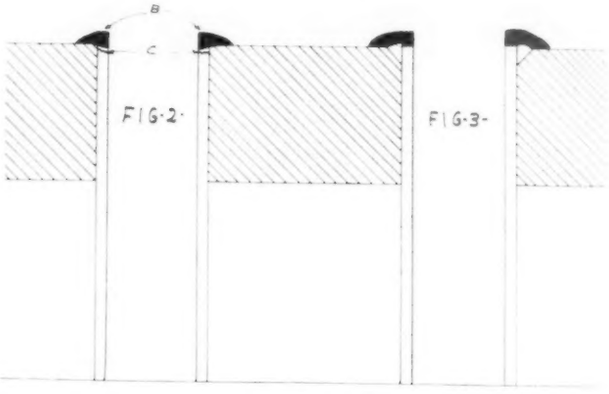
Fig. 1.

to move up or down when contraction was taking place in flue sheet, therefore, this, in a large measure, was responsible also for the flues cracking.

Now, after this experience it certainly was necessary to find a way to overcome the difference of expansion and contraction that existed between a tube 1½ inches in diameter and only 3/16 inch thick and a flue sheet 2½ inches thick, and we also had to take in consideration that around the outside row of flue holes in sheet there was 10 inches of solid metal, and in addition to that the flue sheet was fastened to the flange of a convertor shell that was 2½ inches thick and 7½ inches wide, the flange and sheet being held together with 24 3-inch nickel steel bolts. Our reasons for bolting these together was to hold the flue sheet in line while welding was being done, also while it was cooling.

It was then figured out that to make a success of these convertors, there were 48 to build in all, that a weld would have to be made that would be ductile enough to allow for this wide difference of expansion and contraction that existed between these metals, whose thickness varied so much, and to get a flexible weld, crystallization, which naturally exists in all steel welds, would have to be removed as much as possible, and the methods applied to do this is shown in Figure No. 3.

It will be noted that each one of these 85 tube holes in flue sheet was countersunk one-quarter of an inch deep and one-quarter inch wide. The tube was set to extend a quarter of an inch higher than sheet, three welders started welding at different parts of sheet, and started their weld at center of bridge, and after building up about one-eighth of an inch, the countersunk was bridged from the start of weld to the top of tube, the weld being about a quarter inch thick, and after all the welds were completed sheet was allowed to cool. After the head was thoroughly cool four welders heated the entire sheet to about 1,500 to 1,700 degrees F. and then covered the entire flue sheet with asbestos scrap and allowed to cool gradually, this operation thoroughly annealed the welds and naturally densified the grain, removed a large part of crystallization, and increased their ductility, or elasticity, or in other words increased their stretching power, and so in cooling when contraction was taking place, the welds were flexible enough to withstand or overcome any pulling



Figs 2 and 3.

strain imposed by the sheet while cooling and contracting, and also made plenty allowances for the tubes to raise or lower as the case may be, the weld being oval in shape, allowed it to straighten out without imposing any strain on it.

Now, after the convertor was cooled and thoroughly contracted, we again assembled it and subjected it to 220 pounds steam pressure and maintained same for several hours, without any leaks developing in tubes whatsoever. We then allowed convertor to again cool off, and repeated this operation three different times and found after each test that the entire convertor was absolutely tight.

After subjecting this convertor to this severe test and found same O. K. we then proceeded to weld the balance of the order as outlined and when entirely completed and examined, subjecting each one to 110 pounds air pressure, then to 280 pounds hydrostatic pressure, having no further trouble, and between the months of March and September, 1918, 48 of these convertors have been welded and installed and up to the present writing not one has given any trouble of any kind, but are giving entire satisfaction; in fact, since completing this original lot of 48 we have welded 3 convertors that were a great deal larger in length, diameter and thickness of metal. Figure No. 4 shows this flue sheet and our method of preparation; it also shows a number of these flues welded and a number unwelded, and Figure No. 5 shows the entire flue sheet with the 85 tubes completely welded.

It would be hard to find a superintendent or work manager throughout the land, who has not felt the impulse of the wave of increased production that has swept the country.

On every hand you hear Efficiency Men talking in the most matter-of-fact way how they are getting production with TORCHWELD APPARATUS in volumes considered impossible a few years ago.

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High Grade Welding and Cutting Apparatus—Portable or Generator Outfits

BRANCHES: New York Pittsburgh Cleveland Detroit

The ELECTROCHEMICAL INDUSTRIES *at* SHAWINIGAN FALLS

Description of the Development of Over Three Hundred Thousand Horsepower and of the Varied Industries Attracted by This Resource—Conditions Are Favorable for Labor, Raw Materials and Transportation

By Henry C. Randall

Shawinigan Falls is located in the Province of Quebec, Canada, midway between Montreal and Quebec City, and derives its name from the Indian word indicating the resemblance between their beautiful quill and bead work and the great falls of the St. Maurice River. The city is of comparatively recent origin, having been until 1898 a wilderness many miles from the nearest railroad. That year marked the commencement of the development of power at the falls of the St. Maurice River, which are 150 feet high at this point and offer what is perhaps the most remarkable natural power development in the world.

Since 1900 the growth of the city has been extremely rapid because with the coming of the Canadian Northern Railway and the Canadian Pacific Railway the products of immense electrochemical plants, which could obtain cheap power near the falls, were able to cheaply reach the world's markets. Twenty miles below Shawinigan Falls lies Three Rivers, at which point the St. Maurice River enters the St. Lawrence River. Three Rivers is on tidewater, and with its many miles of docks, capable of docking any vessel navigating the St. Lawrence River, is in a position to furnish a remarkably satisfactory export shipping port for the industries which have grown up at Shawinigan Falls.

Power Supply.

The basis for the electrochemical developments at Shawinigan Falls is, of course, the large amount of hydro-electric power which is available at remarkably low prices. The Shawinigan Water & Power Co., which owns the power developments at this point, has at present installed in its generating stations at Shawinigan Falls and Grand'Mere, Que., 330,000 horsepower, of which 265,000 is electric power, the balance of 65,000 being sold as hydraulic power to certain of the local industries at Shawinigan Falls.

While this amount of power is capable of supplying all of the present requirements of the district, the Shawinigan company further owns the Gres Falls, six miles below Shawinigan Falls on the same river, at which point 75,000 horsepower can be developed as soon as required. Moreover, at Grand'Mere, nine miles above Shawinigan Falls, provision has been made for the addition of 60,000 horsepower, and as the foundations have been prepared for this additional capacity, it could be obtained upon relatively short notice. The electrochemical industries at Shawinigan Falls are, therefore, assured of an abundance of hydro-electric power, not only for today, but for a considerable time in the future.

Shipping Conditions.

Shawinigan Falls is served by two railroads, the Canadian Northern Railway and the Canadian Pacific Railway, both of which make connection with the National Transcontinental Railway a few miles from Shawinigan Falls. All switching to the various industrial plants is done by the Shawinigan Falls Terminal Railway, so that switching is conveniently and cheaply obtained and the facilities of each railway equally placed before all of the industries.

Three Rivers, twenty miles from Shawinigan Falls, is situated on tidewater, and will offer after the war, when shipping restrictions are reduced, an ideal export shipping port for seven months in the year. During the winter months when the St. Lawrence River is frozen over, export shipments are made from St. John or Halifax.

Three Rivers also offers an ideal shipping port for serving the Great Lakes trade, so that, especially in summer, Shawinigan Falls industries are placed very advantageously with respect to ocean and lake shipping.

While it is difficult to discuss export shipping rates at the present time, it is nevertheless true that in normal times, averaging a large number of the ordinary heavier electrochemical products, a differential of $2 per ton exists in favor of Shawinigan Falls in summer, and $1 per ton in winter, over Niagara Falls, which city is taken as representing the greatest electrochemical center on the continent. These differentials will, of course, only apply to products which can be exported to ports reached by the Canadian sailings, which in general are satisfactory for supplying the European trade. If products are destined for ports not reached by Canadian sailings, it will in general be cheaper to use New York as a shipping point, in which case a differential of between $1 and $2 per ton exists in favor of Niagara Falls.

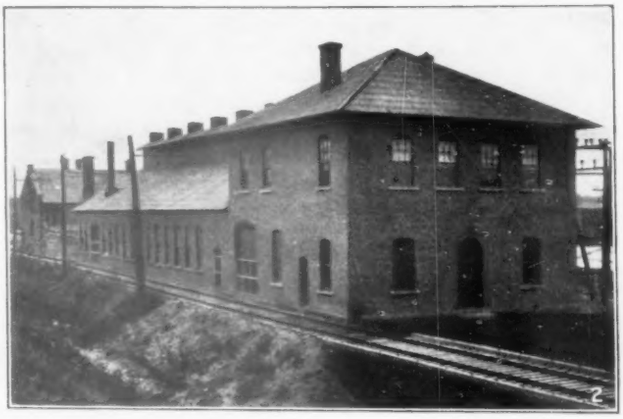
Raw Materials.

Bituminous coal in normal times is obtained from Nova Scotia, costing normally (pre-war) $3.20 per ton on wharves at Three Rivers. Anthracite coal is obtained from United States coal fields. Coke to the amount of about 200,000 tons per year is made at Montreal, largely from West Virginia coal, and can be obtained at very favorable prices.

Petroleum coke to the amount of about 5,000 tons per year is manufactured at Montreal, about one-half being made from mid-continent crude-oil and the balance from Mexican crude oil.

Tar to the amount of 3,000,000 gallons per year is produced by the Montreal Gas Company, which is refined and from which 15,000 tons of pitch per year is available.

High grade limestone, quartz and sandstone are available in large quantities near the St. Maurice Valley. Chromium and titanium ores are found and mined commercially within one hundred miles of Shawinigan Falls, as well as zinc, magnesite and other minerals. Excellent shipping and railroad facilities, putting Three Rivers and Shawinigan Falls in touch with the world, make the supply of those raw materials required for particular processes a relatively easy problem for the manufacturer.



FIGS. 1 TO 8.

Fig. 1—Canadian Electrode Co. Plant. Fig. 2—Shawinigan Electro Metals Co. Plant. Fig. 3—The Northern Aluminum Co., Ltd., Plant. Fig. 4—Canadian Ferro-Alloys, Ltd., Plant. Fig. 5—Shawinigan Developments. Fig. 6.—Canadian Aloxite Co. Plant. Fig. 7—Canada Carbide Co. Plant. Fig. 8—Prest-o-lite Co. Plant.

Labor Conditions.

The St. Maurice Valley is essentially an agricultural community, and as it is largely populated with the thrifty and home-loving French race, there is available on the markets of the industrial centers food products at very fair prices, which is an essential condition in maintaining stable labor conditions. The large families which are common in the Province furnish practically all of the labor required in the industrial centers, and this labor, being French and thrifty,

View of Portion of Chemical Section.

settles down and readily becomes a permanent part of an industrial community.

The amount of labor available in the Province is very large and is of the kind adapted to industrial work, to which statement the large New England industrial centers of Manchester, Fall River and Lawrence bear witness, as the population of these cities is largely made up of French-Canadian people from the Province of Quebec. It is remarkable that in spite of present-day conditions no strikes or other great evidences of labor unrest have ever been found in the Shawinigan Falls-Three Rivers district. The natural traits of the French people, their thrift and frugality, make labor conditions in the St. Maurice Valley exceptionally satisfactory to the manufacturer.

Fraser Brace Co.'s Electric Furnace Plant.

Growth of Shawinigan Falls.

The first electrochemical industry to establish itself at Shawinigan Falls was the Pittsburgh Reduction Co., now the Northern Aluminum Co. Soon afterwards the Canada Carbide Co. was started, and in 1905 the Belgo-Canadian Pulp & Paper Co. built their first mill. These industries expanded rapidly to many times their original proportions, but no other industries were established at Shawinigan Falls until 1914.

During this period a very large market for the power generated by the Shawinigan Water & Power Co. was built up throughout the Province of Quebec, transmission lines being built to serve all the larger cities of the Province and over a hundred of smaller towns. In 1915, however, a very large addition to the generating capacity of the Shawinigan company was completed, and this, with the great demand for power existing throughout the country and the inability of manufacturers to obtain power, made the growth of Shawinigan Falls extremely rapid from that time on.

The population of Shawinigan Falls in 1912 was about

Gres Falls.

8,000; in 1918 its population had increased to 14,000. This great increase in population was brought about by the influx of labor from the surrounding territory for the new electrochemical plants constructed since 1915, descriptions of which are given below.

The Northern Aluminum Co. is located outside of the electrochemical district, but adjacent to the power developments of the Shawinigan company. This location was chosen on account of the fact that the Aluminum company utilizes hydraulic power for their works rather than the electric power of the Shawinigan company, although a considerable amount of electric power is now purchased by them.

Their works, of an extensive nature, cover about fifteen acres of ground and contain, besides the reduction rooms for the production of aluminum, an ingot room and a rolling mill and a wire-drawing and cabling plant.

The Canada Carbide Co. occupies some fifteen acres of land in the industrial district. The company employs some

The Canadian Electro Products Co.

500 men and manufactures calcium carbide and acetylene gas only and utilizes about 50,000 horsepower.

The Shawinigan Electro Metals Co., whose plant was constructed and put into operation in 1915, produces metallic magnesium in many forms and occupies about five acres with their various processes. They utilize about 2,500 horsepower in both alternating and direct-current furnaces.

The first plant of the Canadian Electrode Co. was constructed in 1915, but since that time two additions to the

Welders' Goggle No. 5

The above cut represents our No. 5 Goggle, Leather body with collapsible cups. Mounted with Dark Gray Green glass, Light for Cutting, Medium dark for Welding and Extra Dark for heavy work, also furnished with Blue, Amber or Clear White glass.

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295 Pages, 6x9 Inches, 213 Illustrations

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Electric welding has become so important an art in the mechanical industries that a comprehensive treatise on this subject covering both the resistance and the arc welding processes is needed in the trade. A special study of the subject has, therefore, been made by the authors of this work, who have been assisted in their work by the experts in resistance and arc welding of some of the most prominent concerns in the United States engaged in this line of work.

Consultations with the experts of these companies have made it possible to obtain thoroughly up-to-date information embodying the latest developments and discoveries in the art, and it is believed that, for this reason, the book will prove especially useful to those who are already employing electric welding equipment or who are contemplating its use, as well as to the students of the subject who desire to obtain authoritative information on the electric welding processes.

CONTENTS

Electric Welding Processes—Electric Resistance Butt-Welding Special Butt-Welding Machines and Processes—Electric Spot-Welding—Seam-Welding and Riveting—Percussion Welding—Electric Soldering—Principles of Electric Arc Welding—Applications of Electric Arc Welding—Welding Transformer Tanks by Electric Arc.

"Electric Welding" is splendidly bound in green cloth. It is fully illustrated with cuts and engravings and gives in its 295 pages exactly the data and information on electric welding that the man in the machine building plant requires.

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Asbestos Mittens, plain, one finger and thumb.
Asbestos Mittens, reinforced, one finger and thumb.
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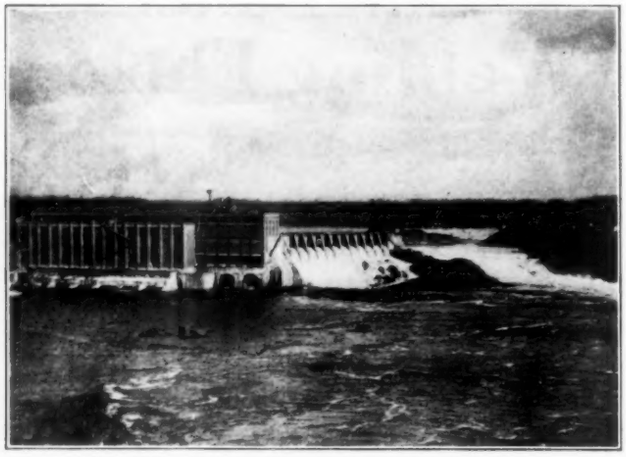
plant have been made, so that the present capacity is about four times the original capacity. This company manufactures the larger sizes of carbon electrodes for electric furnaces and have an output of about 30 tons per day. The majority of the output is used in Shawinigan Falls, although a considerable tonnage is exported.

The Canadian Electro Products Co. manufacture acetic acid, acetaldehyde, paraldehyde, acetone and other similar products from acetylene gas supplied by the Canada Carbide Co. This plant, while primarily constructed for the purpose



Laurentide Power House.

of supplying acetone and acetic acid to the British Government, has so demonstrated its possibilities that it will continue to be one of the most important industries at Shawinigan Falls when the war is over.

The Prest-O-Lite Co. constructed in 1917 a plant for compressing acetylene gas for charging Prest-O-Lite cylinders. This gas is purchased from the Canada Carbide Co., near whose plant the Prest-O-Lite works are located.

Fraser, Brace & Co. in 1917 erected a small electric furnace plant of about 1,000 horsepower for the manufacture of low-phosphorous pig iron. This plant has been very successful and is now being expanded into a considerably larger industry.

In 1917 the Canadian Aloxite Co., a subsidiary of the Carbide company, erected a plant covering about fifteen acres of land near the upper end of the electrochemical district. In these works the company utilizes over 20,000 horsepower

Belgo Canadian Pulp and Paper Co.

for the production of such electric furnace products as aloxite, carborundum and ferro-silicon.

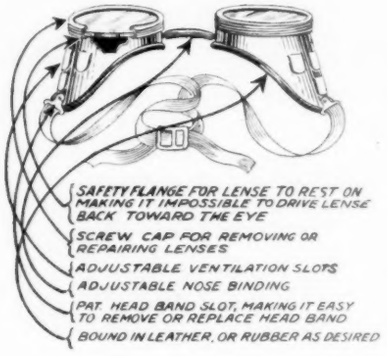
During the summer of 1918 the requirements of the United States Government for acetic acid led to the establishment of a plant practically duplicating the Canadian Electro Products Co.'s plant and erected adjacent to the same. This plant, owned by the American Electro Products Co., will be operated by the Canadian Electro Products Co. for the production of these products on behalf of the United States Government.

The latest addition to the Shawinigan electrochemical district is the Canadian Ferro-Alloys, Limited, who have constructed a plant near the Canada Carbide Co. for the manufacture of ferro-silicon, and utilize some 10,000 horsepower for this purpose.

While not electrochemical, two industries in the Shawinigan district are worthy of mention on account of the large amount of power they consume—the Laurentide Co., at Grand'Mere utilizing 28,000 horsepower for the manufacture of paper and pulp, and the Belgo-Canadian Co., at Shawinigan Falls, utilizing 18,000 horsepower for the same purpose.

NEW SCREW TOP GOGGLE.

The Chicago Eye Shield Company is bringing out a new welders' goggle which embodies now features. The goggle is made of german silver and is bound in either rubber or leather, as desired. It is screw-top goggle, or in other words the lenses may be changed at will. The safety flange on which the lens rests prevents the lens from ever being driven backward towards the eye. The nose bridge is adjustable and is neatly


SAFETY FLANGE FOR LENSE TO REST ON MAKING IT IMPOSSIBLE TO DRIVE LENSE BACK TOWARD THE EYE
SCREW CAP FOR REMOVING OR REPAIRING LENSES
ADJUSTABLE VENTILATION SLOTS
ADJUSTABLE NOSE BINDING
PAT. HEAD BAND SLOT, MAKING IT EASY TO REMOVE OR REPLACE HEAD BAND
BOUND IN LEATHER, OR RUBBER AS DESIRED

covered with rubber. The goggle complete, ready to wear, weighs but three ounces. The number of this goggle is 517-G. The screw top feature will be appreciated by welders as it permits the instant removal of defective or cracked lenses.

NEW WELDERS' CLUB.

The acetylene workers of the Groton Iron Works have a union known as Acetylene Workers No. 278. The union was organized at New London, Conn., February 17, 1919, with a start of 34 members, including welders, burners and helpers. James E. O'Donnell was elected president; Fred Greene, vice-president; W. S. Ormsbee, secretary and treasurer, and Phillip Gray, recording secretary. Meetings will be held twice each month at New London. The secretary, Mr. Ormsbee, can be reached at 306 Main street, Norwich, Conn.

The Master Boiler Makers' Association will hold their regular convention this year on May 26, 27, 28 and 29 at Chicago, Ill., at the Hotel Sherman.

At the organization meeting of directors of Air Reduction Co., Inc., New York, N. Y., held on February 19, 1919 the following officers were elected: A. S. Blagden, president; A. R. Ludlow, vice-president; C. E. Adams, treasurer; M. W. Randall, secretary; C. L. Snow, assistant treasurer; C. C. Emerson, assistant secretary.

The Air Reduction Sales Co., 120 Broadway, New York, have issued several new circulars, among them being "Built Up Rail Frogs" and "Airco Service."

Who's Who

W. A. SLACK.

WILLIAM A. SLACK, manager of Sales of the Torchweld Equipment Company, Chicago, was born in the City of Chicago 1875. Except for about four years spent in Philadelphia and three years spent on the Pacific Coast, Mr. Slack has been a resident of Chicago. He started in the sales profession

William A. Slack.

early in life and has a wide acquaintance all over the United States in both the Manufacturing and the jobbing trade.

Mr. Slack has been identified with the Oxy-Acetylene industry for a number of years and is one of the organizers of the Torchweld Equipment Company, of which he is also Secretary.

NEW ACETYLENE CO.

The Iron Age prints the following:

The Gas Products Co., Columbus, Ohio, has been organized and will build a plant for the manufacture of compressed acetylene. The officers are: George S. Butler, president; Stanley D. Winger, vice-president and general manager; John R. Gobey, secretary and treasurer. Only recently Mr. Winger resigned as general manager of the compressed acetylene department of the Oxweld Railroad Service Co., Chicago, a subsidiary of the Union Carbide & Carbon Corporation. Before becoming connected with the Chicago company he was manager of the railroad sales and service of the Prest-O-Lite Co., Inc., Indianapolis, previous to its absorption by the Union Carbide & Carbon Corporation. The new company has ample capital and expects to have a thoroughly modern compressed acetylene manufacturing plant in operation within the next ninety days.

Mr. S. D. Winger, vice-president and general manager, writes *The Welding Engineer* as follows:

"The Gas Products Co. was incorporated under the laws of Ohio, February 10th, to manufacture and deal in compressed acteylene and all other products essential to the oxy-acteylene process of welding and cutting.

"Our charging plant, thoroughly modern in every respect, is now under construction and will be located not a mile west of High Street, the main north and south thoroughfare of Columbus, Ohio. The location for the charging plant is isolated, and lies between the main lines of the Pennsylvania Railroad on the south and the main line of the Toledo & Ohio Central Ry. on the north. The location is not more than 300 feet from the bank of the Scioto River.

"We will have our own siding and warehouse facilities for large supplies of compressed acetylene, oxygen, calcium carbide and oxy-acteylene supplies and equipment. We will have constructed ample numbers of cylinders to take care of, not only the anticipated production of acetylene for starting, but also enough to allow for the material increase in business which we shortly expect.

"Our cylinders will conform to the rigid specifications of the Interstate Commerce's Bureau of Explosives. The acetylene manufactured by the Gas Products Co. will be purified and sold under the coyprighted name of 'Red Head Acetylene.' Our cylinders will be distinctively marked, in that the heads will be painted a brilliant red, extending down for about three inches below the lower edge of the head proper.

"Columbus, Ohio, is in the center of a thriving industrial district and is a logical distributing center because of its unusual facilities for shipping, both by steam and electric railroads.

"The Gas Products Co. is fortunate in being amply financed and has identified with it some of the most successful business men in Columbus, Ohio. The officers of the company are:

"George S. Butler, president.
"Stanley D. Winger, vice-president and general manager
"John R. Gobey, secretary-treasurer.
'The board of directors is comprised of:
"George S. Butler.
"Stanley D. Winger.
"John R. Gobey.
"E. Mithoff Nicholas.
"James L. Bracken.
"Walter Martin.
"F. Howard Auld.

"We expect to be able to deliver acetylene within the next sixty or ninety days. We will maintain a sales organization adequate in size to cover the state of Ohio and the territory logically adjacent thereto. The plant at Columbus, Ohio, is but the first of several which we have in mind for construction a little later on."

The welders at the Squantum Works in Boston have organized a union and have sent a delegate to present their claims before the American Federation of Labor at Washington. We understand the subject of recognizing the welders, will be considered at a coming labor convention at Atlantic City. Local organizations interested in sending delegates to this meeting can secure further information by addressing Mr. C. A. Phillips, 163 Huntington Ave., Boston, Mass.

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The Welding Engineer wishes to increase its influence in every state and particularly in the following states, and to apparatus salesmen or welders in this territory will make a **liberal** proposition.

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Maine	Arkansas
South Carolina	Florida
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Vermont

Write me for information about our liberal agent's offer.

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The Ideal Face Shield *for* Electric Welders

THE Ideal Face Shield is constructed of Aluminum and Vulcanized Fibre, resulting in durability and minimum weight.

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All glass can be removed and cleaned or new glass applied without the aid of tools.

The Ideal Face Shield is so designed that the glass is always in line with the eyes and the parts being welded.

The Ideal Face Shield can be adjusted to fit any operator.

No metal touches the face, therefore no possibility of a shock should any part of Shield come in contact with pencil-holder or parts being welded.

The Ideal Face Shield rests entirely upon the head, thus permitting the operator the free use of his head and arms at all times.

The Shield can easily be placed upon or removed from the head.

The Ideal Face Shield is so constructed that it is almost impossible for any light or reflection to reach the eyes from the sides or back; and a fire-proof apron protects the chest of the operator from the heat of his own arc.

The Ideal Face Shield can be found in many of the Railroad Repair Shops, Steel Mills and Shipbuilding Yards throughout the United States and Canada.

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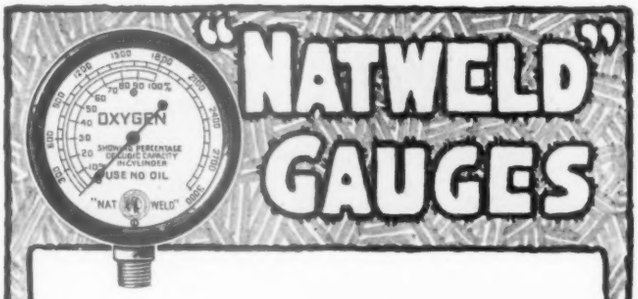

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NATIONAL GAUGE AND EQUIPMENT CO. LACROSSE WIS.

The International Oxygen Company, of Newark, N. J., has opened offices in the First National Building, Pittsburgh, Pa., in charge of R. A. Cornwall. Philip Wesley, formerly Pittsburgh representative of the company, has been placed in charge of the Chicago sales office in the Railway Exchange Building, Chicago.

The British branch of the International Oxygen Company, known as the Integral Oxygen Company, Ltd., has commenced the manufacture of I. O. C. electrolytic cells and other products for the British market. E. L. W. Byrne is the general manager in charge, with offices at 38 Victoria Street, Westminster, London, S W.

Classified Ads

Help Wanted—25c per line, minimum 4 lines.
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Other Ads—50c per line, minimum 4 lines.
Count 8 words to line. Add 6 words for keyed address.

Wanted—Salesman to solicit subscriptions to *The Welding Engineer*, or furnish names of possible readers. Compensation good. Correspondence confidential. Write Mackenzie.

Position Wanted—12 years' welding experience. Recently employed as demonstrator and service man for the Air Reduction Company. Thomas J. Leddy, 173 Ferry St., Newark, New Jersey.

Wanted—Salesman for welding wire to cover New York and vicinity. Must be an expert oxy-acetylene and electric welder. Will be paid on a salary and commission basis. A good man, even without previous experience in selling will receive consideration. Address, "Welding Wire," care The Welding Engineer. 1t-Mar.

The Welding Engineer has on hand four bound volumes of *The Welding Engineer* for the year of 1918. These volumes are very substantially bound and sell for $7.00 each.

For Sale—Prest-O-Lite welding outfit. Herman Lambrecht, Sullivan, Ill. 1t-Mar.

Wanted—Foreman for oxy-acetylene and arc welding department, engaged on heavy plate work. Experienced, well qualified, middle aged man desired. Address, giving experience and reference, to Struthers-Wells Co., Warren, Pa. 1-t-Mar.

Wanted—Welders, experienced on sheet aluminum. Rate $1.00 per hour, 48 hour week; good opportunity for high class men. S. Blickman, 199 Lafayette street, New York, N. Y. 1-t-Mar.

WANTED—BY CUSTOM SHOPS, PACIFIC COAST, CANADA, FIRST-CLASS WELDER, CAPABLE OF HANDLING HEAVY WORK, MOSTLY CAST IRON; ALSO TAKE CARE OF SHOP; ONE WHO CAN HOT DRESS HIS WORK; WILL PAY $35.00 PER WEEK AND PERCENTAGE; BUSINESS ESTABLISHED FIVE YEARS; SPLENDID OPPORTUNITY FOR RIGHT MAN. ADDRESS B. C., CARE *THE WELDING ENGINEER*. 1-t-Mar.

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Prices as follows:

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No. 510, fitted Essentialite lenses, No. 6 shade, for welding and cover glasses.....$3.00 pair
No. 510, fitted with amber, smoked green or deep blue, cesco blue and cover glasses $2.50 pair
Extra cover glasses in clear or amber tint..... .20 pair

"ESSENTIALITE" LENSES

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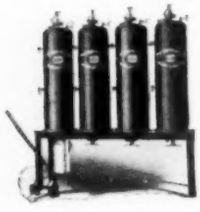

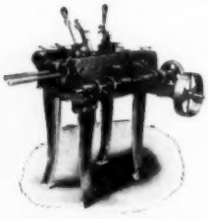

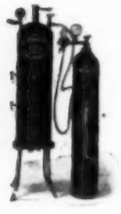

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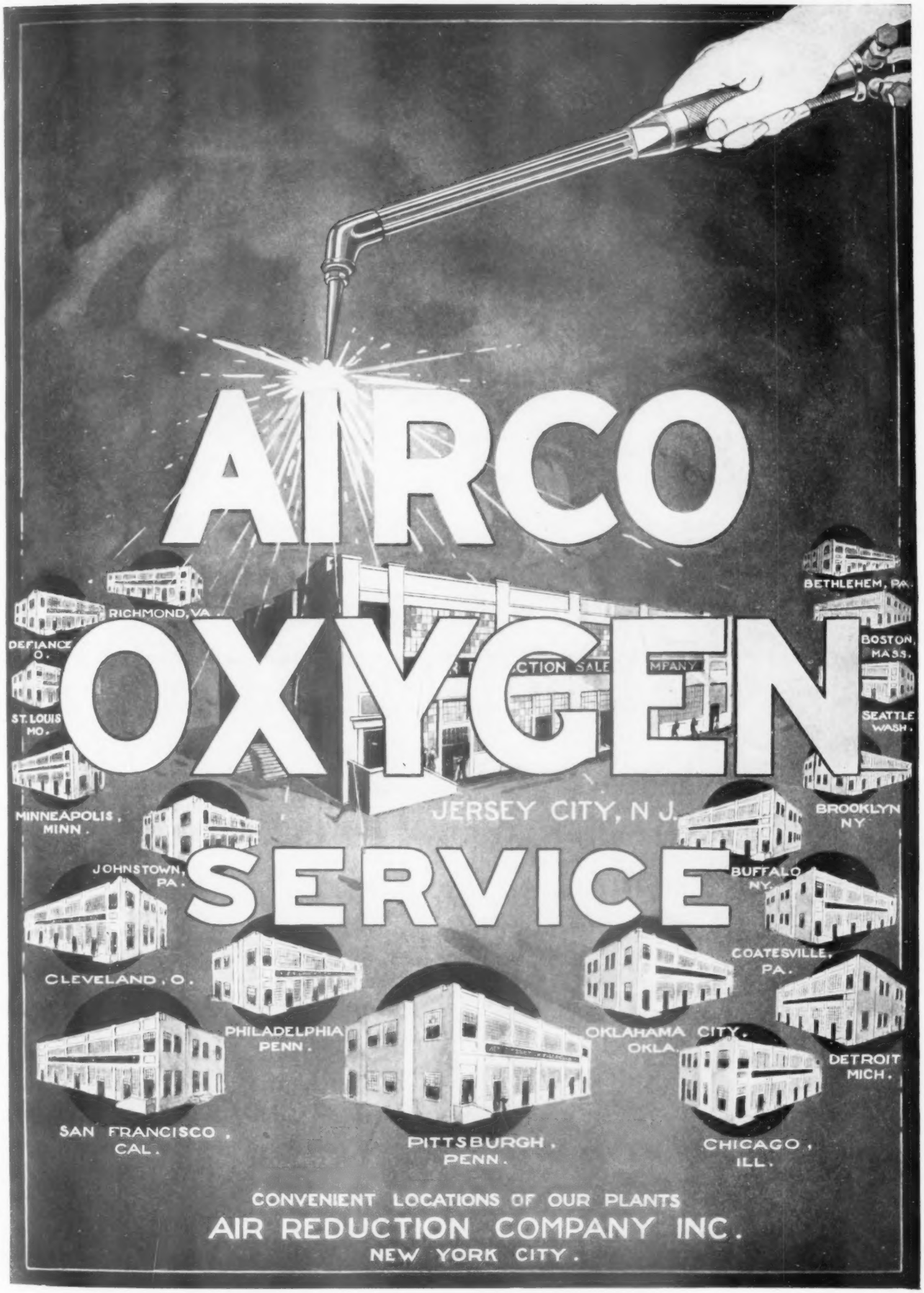
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